EOEA #4426/4584

Draft Environmental Impact Report

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Fan Pier Development

Pier 4 Development

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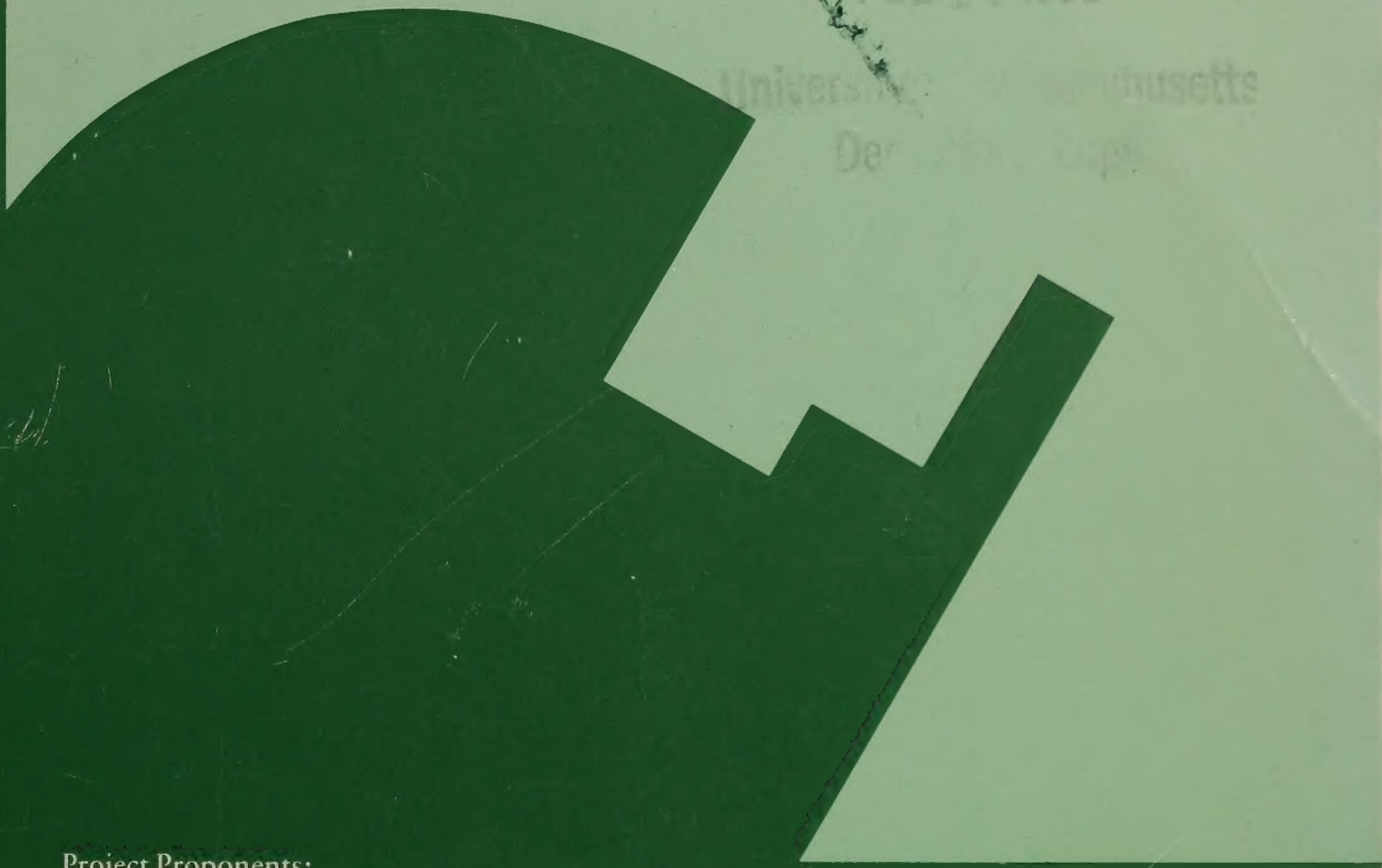

Project Proponents:
HBC Associates (Fan Pier)
The Boston Mariner Company (Pier 4)

Prepared by:
Skidmore, Owings & Merrill
Vanasse/Hangen Associates, Inc.
Tech Environmental
Wright Brothers Facility, MIT
Jason M. Cortell and Associates Inc.
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I

Summary

FAN PIER DEVELOPMENT
PIER 4 DEVELOPMENT
(EOEA #4426/4584)

This Draft Environmental Impact Report (EIR) examines a series of master plan development alternatives for the Fan Pier site and the Pier 4 site, two abutting properties along South Boston's waterfront, in the city of Boston and Suffolk County. The Fan Pier and Pier 4 Developments are separate projects, proposed by separate developers, and designed by separate architects. The projects are joined for this Draft EIR at the request of the Massachusetts Secretary of Environmental Affairs for the purpose of assessing their cumulative effects. This first chapter presents an overview of the projects' evolution and in summary describes the condition of the existing sites, the proposed development alternatives, the probable environmental impacts, possible mitigation measures, permits and approvals, and other data. Subsequent chapters examine each of these aspects of the proposed developments in greater detail.

EVOLUTION OF THE PROJECTS

The development alternatives described in the following pages have evolved from an active, lengthy, multifaceted public review process. In 1981, a single, mixed-use master plan was prepared for the two sites. This original plan is cited in the Environmental Notification Forms (ENFs) filed with the Massachusetts Environmental Policy Act (MEPA) Unit of the Executive Office of Environmental Affairs for each project in 1982 (see the ENF Appendix). The original ENF master plan had little relation to the area's street grid, and was ringed by tall buildings at the harbor's edge limiting public access to the water. Public review of the plan as presented in the ENFs resulted in the general criticism that the design was insensitive to the prominent waterfront location of the piers and to the historic character of Boston. In the combined scope for the two projects (see the Scope Appendix), MEPA underscored this concern for design by requiring the preparation and analysis of a "lesser-scale alternative" for each project. In particular, the lesser-scale alternatives were to address building heights and compatibility with waterfront development. In addition, MEPA requested further consideration of the fill required to construct the original ENF master plan since state public policy does not favor new filling of the harbor.

After extensive consultation with federal, state, and local agencies, the original master plan was retired by the developers, who proceeded to study the public comments and emerging local and state policies that advocated opening the waterfront to the public. Each developer then selected a new architect to respond to the public concerns and the special characteristics of the individual sites. After several months' work, the architects delivered two new master plan concepts, one for Fan Pier and one for Pier 4. The mix of uses in each plan was similar to that of the original ENF plan, but the design for each site was altered extensively to encourage active public use of the sites.

To foster communication and to benefit from public responses during the early design phases of the new plans, the developers worked with city, state, and federal agencies to coordinate a cooperative, interagency review process at each level of government. In addition, the proponents sought input from public and private groups representing neighborhood, architectural, historical, Boston Harbor, and commercial boating interests.

The developers began with preliminary presentations of their new master plans to the Boston Redevelopment Authority's urban design staff and the Civic Advisory Committee (CAC), appointed by the BRA as a citizen review group for both projects. The Fan Pier Master Plan was first presented in February, 1985, followed a few months later by the Pier 4 Master Plan. These two master plans presented in early 1985 are referred to in this Draft EIR as the "Initial Proposals" or "Initial Master Plans." Early reactions to the Initial Proposals indicated that the two new master plans had successfully responded to much of the criticism toward the original ENF plan. The developers then began an extensive series of presentations to solicit more detailed comments on each plan.

For both projects, the most repeated public comments addressed issues concerning the urban design, public access, and water-dependent uses proposed by the master plans. These review comments, coupled with the earlier MEPA requirement for alternatives, provided the catalyst for each developer to propose a Lesser-Scale Alternative. The two proposed alternatives for each project are economically viable and have the full commitment of each developer.

The basic concepts behind the Fan Pier Initial Master Plan were well received. Specific design issues raised during public review focused on the height of the buildings along the water's edge, the continuity of pedestrian circulation, especially along the Harborwalk, the architectural reinforcement of the fan shape, and further definition of water transportation facilities on the site. With these responses in mind, the Fan Pier developer and architect created a Lesser-Scale Master Plan Alternative that not only addresses the particular concerns raised in public reviews and in MEPA's lesser-scale design requirement, but also further enhances features of the Fan Pier Initial Proposal.

In the case of Pier 4, the first round of reviews in the summer of 1985 suggested that the plan was a marked improvement over that presented in the ENF, but concern was expressed about the overall layout of buildings in relationship to the open space, the continued need for new fill and pile-supported decking for non-water-dependent uses, and the lack of specific provisions for water-related activities. The developer responded by requesting from a newly appointed design architect revisions to the master plan to give a greater sense of openness and public accessibility at the ground level, eliminate all filling of the harbor for non-water-dependent uses, and provide facilities for a variety of water-related uses.

The alternatives presented in this Draft EIR are the outcome of this complex evolution. What started as a single master plan for the Fan Pier and Pier 4 has evolved into separate but compatible master plans for each site, each with an Initial Proposal and a Lesser-Scale Alternative. These recent master plans are the subject of this Draft EIR. In addition, as required by MEPA, a No-Build Alternative for each site is evaluated to provide a base case against which the benefits and impacts of the development plans can be assessed.

Analyzing two projects, each with three possible development scenarios, results in a lengthy document. As much as possible, the sections of this Draft EIR are broken down by project and alternative to facilitate review.

FAN PIER AND PIER 4 PROJECT DESCRIPTIONS

- Existing Conditions

Fan Pier Development Site

Located on the waterfront in South Boston, the Fan Pier Development site is bounded by the Fort Point Channel, Boston's Inner Harbor, Pier 4, and Northern Avenue. Of the 18.5 acres that comprise the site, 15.9 acres are pier structure and land, and 2.6 acres are open water. At present Fan Pier consists of partially paved and cobblestone parking surfaces, a shed for the collection of parking fees, a one-story warehouse used for storage by Anthony's Pier 4, Inc., some old railroad cars, a one-story sandwich shop, and facilities for an excursion boat operation. The excursion boat, operated by A.C. Cruise Lines at the western edge of Fan Pier near the mouth of Fort Point Channel, offers day trips to Gloucester, whale watches, and evening charters. The Fan Pier site is not accessible to the public except for the excursion boat services and for commercial parking. The curved pier structure facing the Fort Point Channel and Inner Harbor is largely intact. A granite block dike, put in place at the time of the filling between Piers 1 and 2 on the Fan Pier, makes up a portion of the curved seawall. The seawall along the eastern edge of Fan Pier is deteriorating.

Pier 4 Development Site

The 16.4-acre Pier 4 Development site is bounded by Fan Pier, Boston's Inner Harbor, Commonwealth Pier 5, and Northern Avenue. It is comprised of 8.9-acres of pier structure and land, and 7.5 acres of open water. Anthony's Pier 4 Restaurant--a major area attraction--and a small attached fish market are located at the northernmost tip of Pier 4, with associated at-grade parking covering the remainder of the site. The seawall along Pier 4 requires continued maintenance and repair.

- No-Build Alternatives

If no future development is undertaken on either site, the existing structures and uses would be expected to remain essentially unchanged.

Fan Pier No-Build Alternative

At Fan Pier the present types of uses--parking, excursion boat operation, storage, and sandwich shop--would continue to operate on the site under the No-Build Alternative. The deteriorating seawall on the eastern side of the site is in need of stabilization whether or not development is undertaken in this location.

Pier 4 No-Build Alternative

With the No-Build Alternative, Anthony's Pier 4 Restaurant and the attached fish market would continue to operate at the end of the pier, with restaurant parking for patrons occupying the remainder of the site. Periodic repairs to the pier structure, and improvements to the restaurant would continue to occur.

■ Initial Proposal Master Plans

The Initial Master Plans for Fan Pier and Pier 4--each developed in response to comments on the original ENF master plan--feature mixed-use developments that encompass residential, office, retail and restaurant, underground parking, water transportation, marina, and public open space uses. Both Initial Master Plans seek to reflect Boston's downtown urban character, and to provide pedestrian and visual access to the waterfront while respecting the sites' relationship to South Boston.

Fan Pier Initial Proposal

In the Fan Pier Initial Master Plan, the development will incorporate approximately 3.4 million square feet (s.f.) of residential, office, hotel, and retail space and 2,500 underground parking spaces, and will provide facilities and open space to promote public access and usage of the waterfront. Approximately 50 percent of the site will be dedicated to public open space. Sleeper, Farnsworth, and Pittsburgh Streets, which lie south of Northern Avenue, will be extended onto the site, serving to integrate the development into the existing city street grid. A new canal will run east to west across the site, connecting the Fort Point Channel to a new marina created in the cove between Fan Pier and Pier 4. Four office buildings will border Northern Avenue, with retail uses housed in the lower levels. A building at the southwest corner of the site, nearest the Fort Point Channel, will accommodate support and retail services for commercial and recreational boating. North of the canal will be three residential buildings and a major hotel, with some additional retail space on their lower floors. Major public features of the development will include a marina, water transportation facilities, a waterfront park, public walkways, and views to the downtown and the Inner Harbor. The city-promoted Harborwalk will be extended approximately 2,000 linear feet (l.f.) along the entire perimeter of the site from the Northern Avenue Bridge to Pier 4. In addition, the canal will provide approximately 2,000 linear feet of new waterfront access.

Pier 4 Initial Proposal

The Initial Master Plan for the Pier 4 Development maintains the existing Anthony's Pier 4 Restaurant and proposes approximately 1.7 million s.f. of new residential, office, hotel, and retail space, and 2,200 parking spaces below grade. More than half the site will be accessible to the public, with an approximately 2,000-linear-foot extension of Harborwalk, public viewing platforms along the water's edge, a marina, and an oval-shaped public plaza that will provide a terminus for the eastern end of the Fan Pier canal. To accommodate a portion of the development, the Pier 4 Initial Proposal will require some filling of the harbor and construction of an access roadway on pile-supported decking over the water.

■ Lesser-Scale Alternative Master Plans

The Lesser-Scale Alternative Master Plans for each site--developed as required by the MEPA scope and in response to public comments on the Initial Proposals--focus on design elements that further enhance the compatibility of the developments with their waterfront locations. Particular attention was paid to eliminating the need for harbor fill for non-water-dependent uses and reducing the height of buildings closest to the harbor. The resulting Fan Pier Lesser-Scale Alternative and Pier 4 Lesser-Scale Alternative accentuate the special quality and character of the projects' waterfront sites.

Fan Pier Lesser-Scale Alternative

For the Fan Pier Development, the Lesser-Scale Alternative represents a refinement of the Initial Master Plan. Like the Initial Proposal, the Lesser-Scale Alternative will require no filling of the harbor for non-water-dependent uses. The Fan Pier Lesser-Scale Master Plan responds to four major comments made about the Fan Pier Initial Proposal during preliminary public reviews: (1) that pedestrian circulation should be continuous along Harborwalk at the harbor's edge, (2) that design alternatives with a taller hotel tower should be considered in order to establish a true landmark, (3) that the residential buildings at the water's edge should be be reduced in height, and (4) that the master plan should reinforce the historic curved outline of Fan Pier.

While retaining the mix of uses--retail, office, hotel, and residential--established for the Initial Master Plan, the Lesser-Scale Alternative reduces the overall square footage of programmatic area by approximately 139,000 s.f., for a total of approximately 3.25 million s.f. of planned development. North of the canal, the residential buildings nearest the harbor are lowered in height. The hotel tower is raised to provide a landmark for the South Boston waterfront, allowing the elimination of a mid-rise element proposed in the Initial Master Plan at the canal end of the hotel. Along Northern Avenue, two office buildings are raised in keeping with their more urban location along a city street. In addition, the master plan for the Fan Pier Lesser-Scale Alternative incorporates an enhanced public waterfront park, marina, and water transportation facilities. Pedestrian bridges, with access for the handicapped, are added at each end of the canal, making Harborwalk continuous along the Fan Pier waterfront. Finally, several buildings along the canal and at the water's edge are rotated slightly to architecturally reinforce the orientation of the canal and the fan shape of the site.

Pier 4 Lesser-Scale Alternative

The Lesser-Scale Alternative for Pier 4 represents a new master plan, which is quite different from the Pier 4 Initial Proposal. It alleviates the need for any new filling of the harbor for non-water-dependent uses by reconfiguring the same uses as proposed for the Initial Master Plan in a different design. Further, the Lesser-Scale Alternative moves building masses back from the water's edge, opening up the public space at the end of the Fan Pier canal to water views and sunlight. The Lesser-Scale Alternative varies the height of the residential buildings along Pier 4, with the taller buildings located closer to Northern Avenue. A hotel/residential building is added as the focal point at the base of the marina. Pedestrian walkways and commercial areas on Pier 4 are designed to link directly to those proposed in the Lesser-Scale Alternative for the Fan Pier. Also included in Pier 4's Lesser-Scale Alternative are a larger marina and designated areas for water transportation services and coastal cruisers.

PROPONENTS

Fan Pier Development - HBC Associates, a joint venture of HT-Boston, Inc., and Carpenter Properties, Inc.

Pier 4 Development - The Boston Mariner Company, Inc., a real estate development and investment company of the Athanas family, owners of Anthony's Pier 4 Restaurant.

MEPA EIR STATUS

Draft

SUMMARY OF ENVIRONMENTAL ISSUES

The potential environmental effects of the Fan Pier and Pier 4 projects are summarized below. For purposes of compatibility of analysis and clarity of presentation, alternatives for the two developments are paired systematically: i.e., the Initial Proposals for Fan Pier and Pier 4 are analyzed as a pair, the Lesser-Scale Alternatives are analyzed as a pair, and the No-Build Alternatives are analyzed as a pair. Chapters IV, V, and VI, and the Appendices should be referred to for more detailed discussion of the assessment of environmental impacts.

■ Traffic-Related Issues

Traffic and Parking

The proposed developments would generate approximately 10,000 vehicle-trips daily in 1990 and 18,500 vehicle-trips at Full Build in 1995. Morning peak hour trips would total 970 in 1990 and 1,950 in 1995. Evening peak hour trips would total 1,200 and 2,380, respectively, for 1990 and 1995.

Roadway impacts were analyzed for three build scenarios: (1) 1990 without the Third Harbor Tunnel; (2) 1995 Full Build without the Third Harbor Tunnel; and (3) 1995 Full Build with the Third Harbor Tunnel. In 1990, four of 27 intersections analyzed would experience a decline in level of service from the No-Build to Build case in the morning peak hour, but would continue to operate at acceptable levels of service. In the evening peak hour, a total of seven intersections would experience a decline in level of service, although none would represent declines from acceptable levels to unacceptable levels.

In 1995 without the Third Harbor Tunnel, 13 intersections would operate at levels of service "E" or "F" in the morning peak hour, while 16 would operate at those levels in the evening peak hour. With the construction of the Third Harbor Tunnel, only seven intersections in the morning peak hour and eight in the evening would continue to operate at levels of service "E" or "F". A comparison of the No-Build and Build conditions with the Third Harbor Tunnel indicates that only one additional location in the morning and three locations in the evening would operate at levels of service "E" or "F" with the Fan Pier and Pier 4 Developments. These intersection conditions represent levels of service prior to mitigation.

The Fan Pier and Pier 4 Developments will generate approximately 27,400 transit trips daily. More than 4,000 transit trips will be generated in the morning peak hour, while more than 4,600 will be generated in the evening peak hour. An additional 770 morning peak hour and 690 evening peak hour transit trips are projected to be added to the transit system by the displacement of commuters who currently park on the Fan Pier. These transit trips will connect to the Red Line at South Station, the Blue Line at Aquarium Station, and to various other transportation nodes in the area.

Based on improvements planned by the MBTA, projected 1995 transit volumes would fall within the normal capacity of the Red Line. The Blue Line is projected to operate over normal capacity but less than crush capacity, based on existing operating characteristics.

A program of mitigation measures is proposed to reduce potential adverse traffic and parking impacts.

Air Quality

Ambient air quality was assessed by performing a microscale analysis of carbon monoxide (CO) concentrations at 60 sensitive receptors adjacent to 19 roadway intersections in the project study area, and at 21 sensitive receptors on the development sites. The analysis examined existing (1985) concentrations, as well as No-Build and Build alternatives for 1990 and 1995. The analysis for 1995 considered traffic-related air quality impacts both with and without the Third Harbor Tunnel.

Modeling results indicate that violations of the National Ambient Air Quality Standards (NAAQS) currently exist at three intersections along Atlantic Avenue at Northern Avenue, Congress Street, and High Street. The CO predictions for 1990 and 1995 show a significant improvement in air quality and elimination of all NAAQS violations as a result of three factors: (1) continued enforcement of the Commonwealth's Inspection and Maintenance Program for motor vehicles, (2) the continuing trend toward cleaner vehicle emissions, and (3) the Commonwealth's plans to relocate and signalize the intersection of Atlantic Avenue and Northern Avenue.

Predicted CO concentrations in 1990 and 1995 show that levels at all sensitive receptors will be in compliance with the NAAQS for both the No-Build and Build alternatives. Mitigation measures are proposed to reduce minor project-related increases in vehicle CO emissions at three intersections. Therefore the Fan Pier and Pier 4 Developments will not interfere with the attainment or maintenance of the NAAQS for CO.

Noise

The Fan Pier and Pier 4 sites and South Boston are subject to noise emissions from aircraft overflights, vehicular movements, construction, and industrial operations. Aircraft and vehicular noise sources predominate in the development area. Noise monitoring for existing conditions at six locations in South Boston indicates that noise levels are typical of dense urban areas. Modeling of future noise conditions, based on 1995 Build traffic forecasts (without mitigation), indicates noise increases less than 3 dBA. With the

Seaport Access Road/Third Harbor Crossing in place, the project-related noise increases are reduced. In either case there is no significant traffic-related noise impacts. Aircraft noise will decrease as more commercial aircraft comply with FAA noise emission standards.

Modeling of future on-site noise conditions indicates that the proposed open space uses are compatible with the predicted noise levels. Residential buildings in the Fan Pier and Pier 4 Developments will require slightly more noise attenuation capability than provided in standard building design.

Construction noise impacts will be mitigated by routing truck trips away from South Boston residential areas and by the use of mufflers and other noise source reduction techniques.

■ Urban Design Issues

Visual Quality

The urban design elements of the Fan Pier Development and Pier 4 Development Master Plans reflect the urban waterfront context of the project sites, while respecting the public goals and guidelines established for waterfront development in Boston. The Fan Pier and Pier 4 master plan designs draw their context from Boston's larger urban context of commercial building types and arrangements, with view corridors, public open spaces, and water views, and from the more immediate context of the Inner Harbor waterfront extending from Commonwealth Pier 5 to Lewis Wharf.

Impacts of the proposed Fan Pier and Pier 4 Developments on the visual environment were analyzed through a series of eye-level views, comparing existing conditions with the Initial Proposal Master Plans and the Lesser-Scale Alternatives for the two projects. For the Fan Pier Development, this analysis highlights urban design elements such as the street grid organization, the new canal, the Fan Pier portion of the proposed marina, the Fan Pier Harborwalk, changes in ground elevation, and the allocation of uses and building massing. The visual analysis of the Pier 4 Development master plan alternatives considers massing configuration and location of building elements and uses, the relationship of the master plan designs to the street and waterfront edges, the South Boston Street grid organization, view corridors, and provisions for public open spaces and water-related activities.

Shadow

The effects of shadows cast by the proposed projects were analyzed for the following seven locations: (1) Fort Point Channel; (2) Northern Avenue; (3) Commonwealth Pier 5; (4) Fan Pier canal and walkways; (5) Fan Pier open space and park; (6) Pier 4 open space and plaza; and (7) Fan Pier and Pier 4 marina. Shadow conditions were studied at four times of the year--at the spring and fall equinoxes, the summer solstice, and the winter solstice. The analysis revealed that Fort Point Channel will be affected by shadows cast by the Fan Pier and Pier 4 Developments during early fall, winter, and spring mornings. Northern Avenue will not be affected by project shadows in the winter, but will be partially shaded in the morning during the rest of the year. Commonwealth Pier 5 will be affected by project shadows late in the afternoon during the fall, winter, and spring. The Fan Pier canal, walkways, open space, and park, the Pier 4 open space and plaza, and the Fan Pier and Pier 4 marina will experience both shade and sunlight throughout the day for all times of year, although the Lesser-Scale Alternatives provide slightly more sunlight on on-site public open spaces than the Initial Proposal Master Plans.

Wind

Using a wind erosion test, a qualitative analysis of wind conditions on the Fan Pier and Pier 4 project sites and the surrounding area was conducted at the Wright Brothers Wind Tunnel facility at the Massachusetts Institute of Technology. The data collected at the wind tunnel was evaluated according to an international standard compiled and published by W. H. Melbourne that establishes categories of relative comfort for pedestrians with corresponding wind velocities. Further, more detailed analysis of wind conditions will be conducted as required by MEPA, when design proceeds beyond the master plan level.

Data evaluating wind conditions for existing conditions and the Initial Master Plan Proposals has been compiled for this phase of the analysis. This preliminary data indicates that with the proposed developments in place, ground wind velocities on the project sites and in the surrounding area will increase from existing conditions. However, the observed wind conditions are predicted to remain relatively mild as compared to average winds recorded in Boston. In addition, the test stations studied were found to experience winds within comfortable categories of Melbourne's criteria for pedestrian-level wind conditions.

Tidelands and Public Purpose

The Fan Pier and Pier 4 sites are comprised of filled tidal flats and open waters. Development activity in tidal flats may be subject to regulation under Chapter 91 of the Massachusetts General Laws administered by the Massachusetts Department of Environmental Quality

Engineering (DEQE). The title history of the proposed development sites indicates that large portions of the parcels were filled during the nineteenth century by the Commonwealth. At the end of the century, the Commonwealth sold the parcels to a private party through warranty deeds that conveyed all the Commonwealth's rights of ownership. Following the transfer of the property from public to private ownership, additional portions of both Fan Pier and Pier 4 were filled, except for a few minor areas, under a series of licenses that eventually were made irrevocable through legislative acts.

The proponents have concluded from the title and fill history of the Fan Pier and Pier 4 project sites that the jurisdiction of DEQE under Chapter 91 is quite limited. Nonetheless, the proponents have designed their master plans to serve a public purpose and to provide a greater benefit than detriment to public rights in tidal flats.

Public Access

Currently, public access to the Fan Pier and Pier 4 is limited to patrons of the parking lot and excursion boat operation located on Fan Pier, and to the restaurant on Pier 4. With the proposed Fan Pier and Pier 4 Development Master Plans, public access to the sites will be improved and expanded.

The Fan Pier Development Initial Master Plan Proposal will devote approximately 50 percent of the total land area to publicly accessible areas, including: the Fan Pier Harborwalk along the pier's perimeter; public open spaces such as a waterfront park, a landscaped urban plaza, and an amphitheater; promenades and retail arcades lining the new canal; pedestrian walkways; docks and a marina breakwater; and enclosed public facilities. Each of these features will be retained in the Lesser-Scale Alternative, which will further enhance the Fan Pier Harborwalk, the canal promenades, and other public walkways, and expand the amount of public open spaces.

The Pier 4 Development Initial Master Plan Proposal will also devote approximately 50 percent of the site's total land area to publicly accessible spaces, including: the Pier 4 Harborwalk along the water's edge; a public common and other public open spaces; pedestrian walkways and arcades in addition to the Pier 4 Harborwalk; docks and a marina breakwater; and enclosed public facilities. With the Lesser-Scale Alternative, the Pier 4 Development master plan design will enhance the publicly accessible areas by opening up the large public plaza toward the marina and harbor beyond, and providing a variety of landside facilities to complement the water-related uses proposed for the site.

Water-Related Activities

Development of the Fan Pier and Pier 4 master plans will provide the project sites with a variety of water-related uses to encourage public access to the city's Inner Harbor waterfront. The water-related uses proposed for the Fan Pier and Pier 4 reflect the public goals and guidelines established for waterfront development in the city.

The Fan Pier Development Initial Master Plan Proposal will provide a variety of water-related uses, including a marina jointly developed with the proponent of the Pier 4 Development, a protective breakwater at the entrance to the marina, a commercial passenger vessel landing, marine services facilities, and a new canal to link the proposed marina and the Fort Point Channel. With the Lesser-Scale Alternative, the Fan Pier Development will provide expanded water transportation services such as an airport water shuttle landing and a cultural/commuter ferry. A feasibility study is currently underway to evaluate the proposed cultural/ commuter ferry service.

The Pier 4 Development Initial Master Plan Proposal will provide a marina jointly developed with the proponent of the Fan Pier Development, and a protective breakwater at the entrance to the marina. The water-related activities proposed for the Pier 4 Development will be greatly expanded with the Lesser-Scale Alternative. A coastal cruise landing will be provided on the Pier 4 breakwater. The Pier 4 portion of the marina will be expanded from 60 to 150 slips. Both a public dinghy dock and a yacht provisioning dock will be provided. The Pier 4 Lesser-Scale Alternative will also introduce an on-demand water taxi service to other sites along Boston Harbor.

■ Construction and Operations Issues

Water Quality

The proposed master plans provide for complete redevelopment of the Fan Pier and Pier 4 sites, except for the existing Pier 4 restaurant which will remain. Short-term water quality impacts may result from the development of the Fan Pier and Pier 4 master plans.

To provide adequate draft for recreational and commercial boats in the marina, the basin between Fan Pier and Pier 4 will be dredged to -15 mean low water. Some of the sediment will be side-cast into deeper portions of the basin. The remaining sediment will be disposed of at the Massachusetts Bay Foul Area. Consultation has begun with the Army Corps of Engineers for the permitting of the proposed dredging and disposal activities. Mitigation measures such as the use of silt curtains around the dredging area will be employed to reduce turbidity and dispersion of suspended solids.

Piles will be installed to create the marina breakwaters, to moor floating docks, and to support the Fan Pier "Marina Walk" above a rip-rap wall. All piles will be percussion-driven. Some rotting piles on the west side of the Fan Pier will be removed.

Other construction activities that may affect water quality include the removal of a sunken vessel underneath the western side of Pier 4, the emplacement of temporary fill for construction of the canal, and placement of rip-rap to stabilize failing seawalls at Fan Pier and Pier 4. Dewatering of foundations will be limited with the use of slurry-wall construction. All of these activities will be planned so as to minimize impacts to water quality. Harbor circulation and flushing will not be impeded. An increase in the amount of water volume in the tidal prism will occur due to creation of the canal, and there will be a slight decrease in the flushing time. No significant impacts on Boston Harbor biota and Boston's fishing industry are expected.

On Fan Pier, much of the existing filled land will be excavated for the new canal and subsurface parking. Existing filled land will also be excavated on Pier 4 to accommodate subsurface parking. A total of approximately one million cubic yards (cy) of excavate is estimated for the two projects. Since the excavate consists of upland materials rather than marine sediments, it must be disposed of on land.

Infrastructure (Sewage, Water, Utilities)

The Fan Pier and Pier 4 Developments are expected to generate wastewater at the rate of approximately 817,000 gallons per day (gpd), an increase of approximately 773,000 gpd over existing conditions. Sewage will be discharged to the sewer in Northern Avenue. This sewer and other down-gradient facilities can accommodate average and peak flows in 1990, however in 1995 there may be some limited surcharging of the sewer during peak conditions.

Neither combined sewers nor combined sewer outfalls/overflows are located in or near the project area. The North Branch of the South Boston Interceptor experiences some wet weather overflows, but no dry weather overflows have been recorded since 1980. The proposed developments will have a negligible effect on these conditions. Existing problems are being addressed by plans for facilities cleaning and upgrading by the Boston Water and Sewer Commission (BWSC) and the Massachusetts Water Resources Authority (MWRA). Storm drainage from the project sites will run through oil/water separators and discharge to Boston Harbor.

Water supply systems serving South Boston are also being upgraded by BWSC, and water system improvements near the development area are being considered in conjunction with the reconstruction of the Northern Avenue Bridge and roadway. These systems are adequate to provide domestic water supplies and water for fire protection for the proposed developments. Gas, electric, and telecommunications systems are planned to be upgraded by utility providers to serve the Fan Pier and Pier 4 Developments and other Northern Avenue developments. Fire alarm facilities in Northern Avenue are adequate to provide for future development needs.

The proponents will continue to coordinate their efforts with BWSC and other utility providers as the designs of the developments progress.

Construction Impacts

Fan Pier construction is expected to begin in fall, 1986, with the first phase of the project completed by spring, 1989. It is estimated that the subsequent phases of project construction will occur during the period 1989 to 1995. The first phase of the Pier 4 Development is planned for construction during the period fall, 1987, to spring, 1990, and later phases are expected to occur during the period 1988 to 1995.

Overall, both developers are committed to as broad a range of construction impact mitigation measures as possible at this, the master planning stage of the projects. Specific measures to mitigate construction impacts related to traffic, air quality, noise, water quality, and water-related activities are proposed for each construction operation on land and in the water. In addition, a series of innovative construction techniques will be used to shorten the construction period, reduce construction-related traffic, and lessen possible impacts on water quality: the use of a slurry wall system, the use of pre-assembled steel structural framing; the re-use of on-site materials such as buried granite blocks; partial on-site disposal of dredged materials within the water areas of the site; and construction of the new Fan Pier canal in the dry.

The slurry wall will help mitigate impacts on water quality by minimizing groundwater seepage in the excavated area. Mitigation measures to deal with turbidity levels will include the use of driven rather than jetted piles, silt curtains, floating booms, and water quality monitoring. Water to be discharged from the sites will be allowed to settle before being pumped out behind silt curtains. The Fan Pier canal will be constructed in the dry, avoiding a wide range of potential water quality impacts.

The effect of construction-related traffic to the Fan Pier and Pier 4 sites will be relatively small and manageable. Truck activity will not exceed 15 to 20 trips per hour to the sites during the peak construction period and will usually be less frequent. The maximum number of construction workers on site at one time will be approximately 650, but there will be fewer vehicle trips due to ridesharing and transit use. Many trips will be made during off-peak times, and impacts will be further offset by the discontinuation of commuter parking on Fan Pier. A traffic control plan that maintains vehicular flows on Northern Avenue and avoids impacts to nearby residential areas will be prepared and reviewed with city of Boston officials. The use of pre-assembled materials and reuse of on-site materials will also help reduce truck trips to the site.

Fugitive emissions from the construction sites will be reduced by periodic watering down of areas subject to wind erosion. Construction noise will be generated by pile driving and heavy equipment operations at the sites, but this is not anticipated to be a major impact. Truck-related noise impacts will be mitigated by the traffic control plan.

During construction of the Fan Pier project, excursion boat facilities may need to be temporarily relocated on the site, but excursion boat operations will be maintained throughout the construction period.

Coordination to alleviate possible impacts from contemporaneous activities will be planned with nearby projects whose construction schedules may overlap with those of the Fan Pier and Pier 4 Developments.

PERMITS AND APPROVALS

In conjunction with the preparation of this Draft EIR, the proponents expect to secure the following agency reviews, permits, and approvals for the Fan Pier Development and Pier 4 Development.

■ Federal

- U.S. Army Corps of Engineers, Federal Clean Waters Act Permit; Rivers and Harbors Act Permit.

- U.S. Department of Transportation, Federal Aviation Administration, Part 77 Objects Affecting Navigable Airspace.
- U.S. Coast Guard, Approval for Construction of Bridges over Navigable Waters of the United States.
- U.S. Environmental Protection Agency, N.P.D.E.S. Discharge Permit.

■ State

- Massachusetts Executive Office of Environmental Affairs, MEPA Certification.
- Massachusetts Office of Coastal Zone Management, Determination of Consistency.
- Massachusetts Department of Environmental Quality Engineering, License for new structures (Ch. 91); Dredging and Dredged Material Disposal Permit (Ch. 91); Approval of Floats and Rafts; Water Quality Certification; Surface Water Discharge Permit; Fossil Fuel Utilization; New Sources of Air Contaminants Review; Dust, Odor, Construction, and Renovation Regulations; Sewer Connection Permit.
- Massachusetts Historical Commission, Determination of Effect to Historic Properties.
- Metropolitan District Commission/Massachusetts Water Resources Authority, Industrial User Discharge Permit.

■ Local

- Boston Conservation Commission, Wetlands Order of Conditions.
- Municipal operating permits, including zoning approval.
- Boston Water and Sewer Commission approvals.

PUBLIC FINANCIAL ASSISTANCE

None

II

Project and Area Description

PROJECT GOALS

The Fan Pier and Pier 4 projects have been planned to revitalize an underutilized, publicly inaccessible area of Boston's waterfront and to provide extensive public benefits. While they represent the work of separate developers and architects, the master planning efforts for these developments share common objectives:

- To create an active new part of the city of Boston, incorporating major public spaces with residential, commercial, and marine uses consistent with public policies and goals for the area.
- To construct a major new part of Boston's waterfront, providing Harborpark/Harborwalk facilities, continuous public access at the water's edge, water transportation facilities, and other water-dependent uses.
- To foster the reawakening of the northern area of South Boston, through the creation of jobs, provision of linkage payments, and participation in the reconstruction of area infrastructure.
- To minimize the environmental impacts of project construction and operation by commitment to an elaborate set of mitigation measures.
- To facilitate active, meaningful public and agency participation in the decision making for the two projects.

DESCRIPTION OF THE SITES

The Fan Pier and Pier 4 sites comprise a total of approximately 35 acres of land and open water along South Boston's waterfront bounded by Commonwealth Pier 5, Northern Avenue, Fort Point Channel, and Boston's Inner Harbor. Fan Pier (Piers 1, 2, 3) and Pier 4 are owned by Anthony's Pier Four, Inc., and Pier Four, Inc. Figure II-1 identifies the locations of the Fan Pier and Pier 4 project sites.

Fan Pier and Pier 4, originally tidal flats, were filled by the Commonwealth of Massachusetts and subsequent private parties, beginning in the mid-1800s. Until World World II, Fan Pier and Pier 4 were used actively by the shipping and railroad industries as a cargo terminal, serviced by railroad spurs that extended onto the piers. After the war other uses such as trucking operations began to occupy portions of the site. Since 1960, Fan Pier has been used primarily for surface parking and for some storage related to Anthony's Pier 4 Restaurant. A sandwich shop and excursion boat operation are also situated on the site. The site is not accessible to the public except for the commercial parking and excursion boat uses. Pier 4 currently supports Anthony's Pier 4 Restaurant, a small fish market attached to the restaurant, and a large surface parking lot for restaurant patrons.

PROPOSED ACTIONS

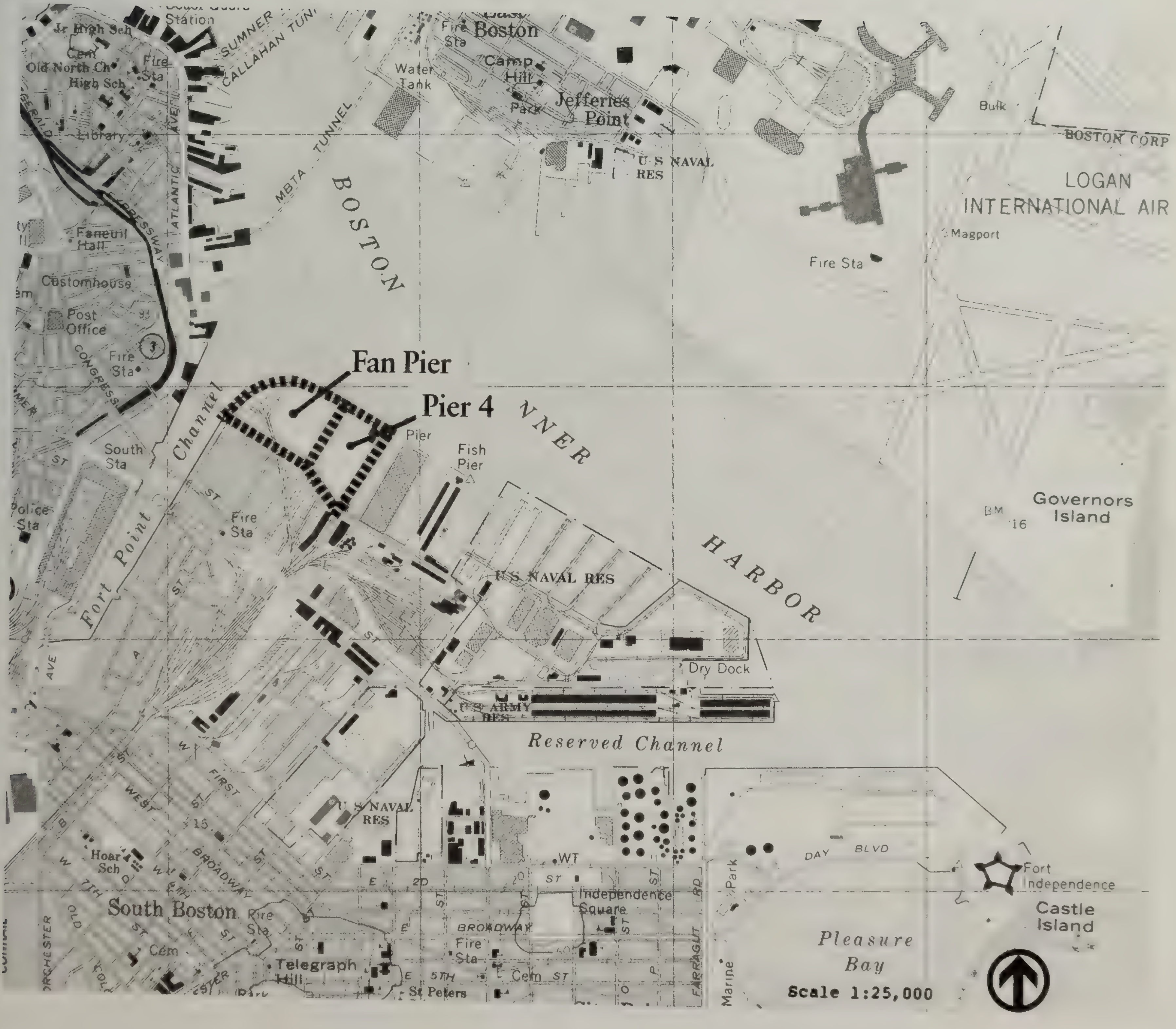
The two proposed actions consist of: (1) the development of Pier 4 by The Boston Mariner Company, Inc., and (2) the development of the Fan Pier by HBC Associates, Inc., a joint venture of HT-Boston, Inc., and Carpenter Properties, Inc., through a leasehold option granted by Anthony's Pier 4, Inc. Implementation of the master plans for these two sites allows an integrated concept for the future growth of this prominent, underutilized location on South Boston's waterfront, adjacent to the city's downtown.

Each proponent has generated an Initial Master Plan that defines the mix of uses on the site and a Lesser-Scale Alternative that concentrates on design modifications to further complement the waterfront locations. Chapter III, Development Alternatives, provides detailed descriptions of these master plans.

PROJECT BENEFITS

Both the Fan Pier Development and Pier 4 Development Master Plans incorporate objectives that enhance the special waterfront location of the project sites. In addition, each development proposal increases the number

FIGURE II-1
USGS Site
Location Map



of city residential units, in keeping with recent local policy objectives, and contributes substantially to the economic development of the city and state. Benefits accruing from each development are summarized below, with any additional benefits derived from the Lesser-Scale Alternative following those of each project's Initial Proposal.

■ Fan Pier Project Benefits

Fan Pier Initial Proposal

Benefits of the $550 million Fan Pier Development to the harbor, the South Boston neighborhoods, the city, and the state include:

o A canal running east to west across the site, adding approximately 1,000 linear feet of new water frontage on each side, providing a protected pedestrian area in the winter, and increasing short-term dockage for small boats in the harbor.

o Support facilities and 300 linear feet of dockage for commercial passenger boats.

o A marina, co-developed with Pier 4, with a minimum of 10 percent of the approximately 80 slips on the Fan Pier side dedicated to transient boaters, and large breakwaters at the marina's entrance to create a place of refuge for boats during storms in the manner generally done by other coastal marinas of similar size.

o A 2,000-linear-foot link in the city's 7-mile Harborwalk.

o Public open space covering almost 50 percent of the site, with walkways, a park, and open plaza areas providing pedestrian and visual access to the waterfront.

o Ground-floor hotel, retail, and restaurant activities that encourage intensive daytime and evening use of public areas, creating a lively waterfront environment.

o Approximately 1,200 construction jobs and 7,600 permanent jobs.

o Tax and linkage payments to the city of Boston.

o Taxes on retail purchases to the Commonwealth of Massachusetts.

Fan Pier Lesser-Scale Alternative

The following benefits for the Fan Pier Lesser-Scale Alternative would be in addition to those listed for the Initial Proposal.

- Bridges at both ends of the canal, providing uninterrupted access for pedestrians and the handicapped along the Fan Pier Harborwalk.
- Expanded public open spaces, comprising more than 55 percent of the total land area of the site.
- A landing adjacent to the hotel for passenger water shuttles.
- A hotel tower providing a landmark on the Inner Harbor, extending the reach of the downtown waterfront.

Pier 4 Project Benefits

Pier 4 Initial Proposal

Benefits of the $300 million Pier 4 Development to the harbor, the South Boston neighborhoods, the city, and the state include:

- A marina, co-developed with Fan Pier, with a minimum of 10 percent of the approximately 60 slips on the Pier 4 side dedicated to transient boaters, and large breakwaters at the marina's entrance to create a place of refuge for boats during storms in the manner generally done by other coastal marinas of similar size.
- A 2,000-linear-foot addition to the city's 7-mile Harborwalk, with viewing platforms on the east and west sides of the site.
- Public open space incorporating approximately 50 percent of the site area, including walkways, arcades, and a major public open space at the end of the Fan Pier canal, providing pedestrian and visual access to the water.
- Daytime and evening hotel, retail, and restaurant uses that will activate this area of Boston's waterfront.
- Approximately 1,000 construction jobs and 3,000 permanent jobs.
- Tax and linkage payments to the city of Boston.
- Taxes on retail purchases to the Commonwealth of Massachusetts.

Pier 4 Lesser-Scale Alternative

The following benefits for the Pier 4 Lesser-Scale Alternative would be in addition to those listed for the Pier 4 Initital Proposal.

- An on-demand taxi/water shuttle landing.
- A coastal cruise ship landing utilizing the eastern most breakwater.
- A public marina dock for transferring supplies from vehicles to boats.
- A large pool that animates the interior of the site and extends the sense of water into the site.
- Approximately 90 additional marina slips.

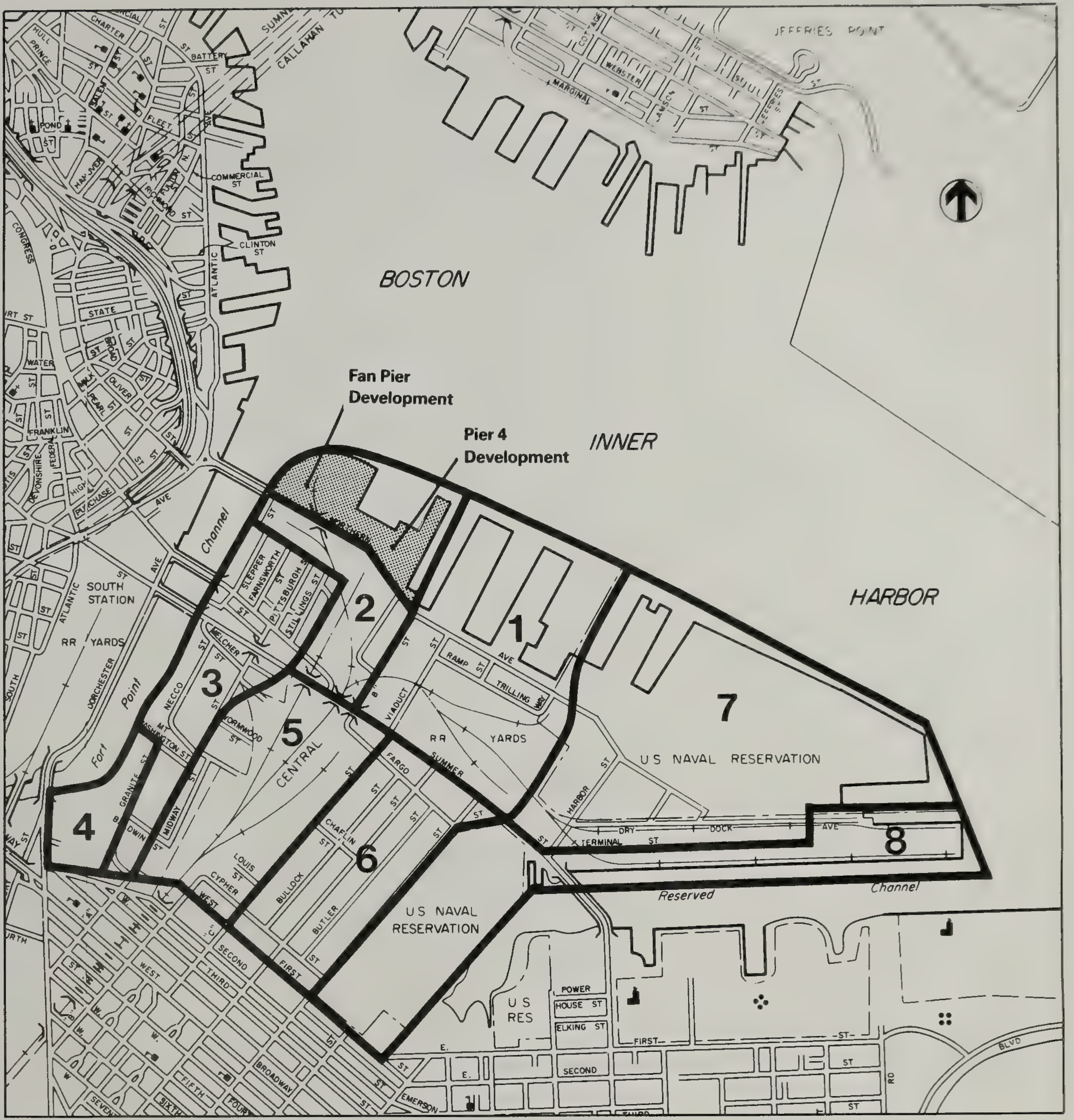
AREA DESCRIPTION

The Fan Pier and Pier 4 sites occupy approximately 25 acres of the approximately 600 acres of waterfront land in the northern portion of South Boston. This 600-acre area is bounded by the Fort Point Channel, the Inner Harbor, First Street, and the Reserved Channel. Industrial, warehouse, truck and rail distribution, institutional, and commercial land uses predominate. Several large, essentially vacant parcels are used primarily for at-grade parking. Some of the manufacturing and warehouse buildings are vacant; a few have been converted to residential, office, and commercial uses.

■ Future Development in the Area

For the purpose of evaluating the existing and potential development in the vicinity of the Fan Pier and Pier 4 sites, the 600-acre northern portion of South Boston was divided into nine subareas (including the project sites) having similar land uses and density characteristics, as shown in Figure II-2. The development potential for each area was determined based on discussions with property owners, managers, developers, and planners, and was reviewed by the Boston Redevelopment Authority (BRA), Massport, and the Fan Pier and Pier 4 Civic Advisory Committee. Estimates of overall development trends were made comparing existing square footage to development forecasted for the year 1995, the year by which the Fan Pier Development and the Pier 4 Development are to be completed. The development and re-use scenarios for subareas 1-8 are summarized below and presented in detail in the Background Development Assumptions Appendix.

FIGURE II-2
Potential
Development
Areas in
South Boston



Subarea 1 consists of Commonwealth Pier 5, Fish Pier 6, and Commonwealth Flats, properties of the Massachusetts Port Authority (Massport). This subarea supports several businesses, including restaurants, warehousing, fish processing plants, an outdoor salt storage area, parking, offices, and retailers. These uses will all continue in the immediate future. The World Trade Center currently under construction at Commonwealth Pier 5 is scheduled to open in December, 1985. Expansion facilities for the World Trade Center are currently being planned for the area of Commonwealth Flats across Northern Avenue from Commonwealth Pier. Additional office space is planned for the renovated Fish Pier buildings and a new building at the south end of Fish Pier at Northern Avenue.

Subarea 2, a vacant property formerly owned by the Penn Central Railroad, is currently a surface parking lot apparently owned by Cabot, Cabot & Forbes (CC&F). Future plans consist of large office development with ancillary retail uses. The initial phases of this development, which are forecast for 1995, include approximately 500,000 s.f. of office space accompanied by 1,000 parking spaces.

Subarea 3 includes approximately 6,200,000 s.f. of built space owned by the the Boston Wharf Company. More than half of this space is used for warehousing and industrial-related activities. Several of the buildings are being converted to residential and commercial uses. The conversion schedule depends on market demands. No plans for significant new construction exist for this subarea.

Subarea 4 supports predominantly industrial-related land uses, dominated by the Gillette Company. Gillette Park contains approximately 1.5 million s.f. of manufacturing/research and office space. Land use in this subarea is not likely to change significantly over the next decade.

Subarea 5, former Penn Central Railroad property, is currently used for parking, transportation (some rail service remains), and distribution. The U.S. Postal Service leases warehouse space to house local mail processing.

Subarea 6 is comprised of a mix of office, commercial, industrial, and storage buildings under varied ownership. No substantial development is expected over the next ten years, although this subarea's long-term development potential could be significant.

Subarea 7 is a former military base. The majority of Area 7 is owned by the Economic Development and Industrial Corporation (EDIC) for the Boston Marine

Industrial Park (BMIP), supporting primarily light industrial and fish processing uses in over 2.5 million s.f. of built space. The Building 114 Design Center is scheduled to open in late 1985 and is anticipated to house many of Boston's design firms for manufacturing, showroom, and office uses. By 1995 additional light industrial and/or office space will be constructed as part of the Harbor Gateway at BMIP.

Subarea 8, also a former military base, is owned by Massport and contains industrial and warehouse buildings. Although there are plans to renovate some of these buildings, they will still contain primarily light industrial and warehouse uses. At the end of 1985, the cruise ship terminal, at one time planned for Commonwealth Pier 5, will be relocated to subarea 8. However, no additional significant development is anticipated by 1995.

In order to provide a context for assessing the possible impacts of the Fan Pier and Pier 4 Developments on the surrounding area, quantitative estimates of the expected development in subareas 1-8 were made. These forecasts to the year 1995 provide the background context in which the traffic, air, noise, and construction environmental impacts are assessed.

III

Development Alternatives

INTRODUCTION

The development alternatives described in this chapter have evolved over the course of five years through an active public review process. The developers have abandoned many of the original concepts first proposed in 1981 in response to public concerns and in an effort to improve the developments. At the time of this Draft EIR, December, 1985, the proposed Fan Pier and Pier 4 projects are at the "master plan" stage--that is, conceptual plans for the sites have been developed that show the location, form, and uses of buildings; the layout and function of public open space and amenities; and the preliminary phasing process by which the projects will be built.

As noted in Chapter I, the Fan Pier and Pier 4 Developments are separate projects, proposed by separate developers and designed by separate architects. The projects are joined for this Draft EIR at the request of the Massachusetts Secretary of Environmental Affairs for the purpose of assessing their cumulative effects (see the Scope Appendix).

The developers are committed to a continued public review process. Furthermore, the proponents of the Fan Pier and Pier 4 Developments are also committed to cooperate with each other for the purpose of creating compatible developments in which public pedestrian amenities and water-related activities function in a complementary fashion.

PROJECT HISTORY

Original Master Plan

- Master Plan Development

A plan to develop the Fan Pier and Pier 4 sites was originally proposed in 1981 when a single master plan was prepared jointly by the developers, and in 1982 when Environmental Notification Forms were filed separately for each site (see ENF Appendix). At that time, a program of mixed uses similar to those currently proposed was presented. However, the master plan for each part of the Fan Pier and Pier 4 area was quite different from the plans discussed in this Draft EIR. The original plan did not emphasize public accessibility to open space. On the Fan Pier, tall buildings were proposed along the curve of the fan, barring visual and public access to the harbor. On Pier 4, a tall building was proposed next to the existing restaurant at the end of the pier, blocking views to the harbor. Both plans required harbor filling and pile-supported decking for non-water-dependent uses. Public review of the original master plan focused on these and other issues, summarized in the combined scope issued on January 31, 1983, by the Secretary of Environmental Affairs. Recognizing the merit of the concerns expressed, the developers began to rethink the design assumptions of the original master plan and undertook separate efforts to develop their sites.

New Master Plans

After consulting with city and state agencies, each developer commissioned a new master plan to address the major public concerns. City plans and guidelines were thoroughly examined. A vigorous attempt was made to lead the public rediscovery of the South Boston waterfront and to address the requirement under the Massachusetts General Laws Chapter 91 that water-dependent uses be actively integrated with non-water-dependent uses.

- Coordinated Public Review Process

The developer of Fan Pier began to present the new master plan for public review in spring, 1985. The new Pier 4 master plan became public in early summer, 1985. A carefully considered public review process was developed with interest groups and governmental agencies at the local, state, and federal levels.

Local Review

The Boston Redevelopment Authority (BRA), acting in its capacity as the city's planning agency, began the design review by designating a joint Fan Pier and Pier 4 Civic Advisory Committee (CAC) specifically appointed to represent concerned constituencies, including the South Boston neighborhoods, local business groups, design professionals, and Boston Harbor advocates. Ongoing meetings are scheduled with the BRA and the CAC throughout the environmental review process and through design development.

State Review

At the state level, a coordinated effort was initiated by the Governor's Development Office in cooperation with the developers. Agencies with environmental interests were brought together early in the development of the master plans, and asked to identify areas of concern and to consider approaches to resolving these issues. The State Interagency Coordinating Committee's key member agencies are the Department of Environmental Quality Engineering, the Executive Office of Transportation and Construction, and the Office of Coastal Zone Management, with other agencies sending representatives from time to time.

Federal Review

An interagency group was also assembled at the federal level. This group's jurisdiction over the sites is slightly less extensive but no less significant than the state's. Therefore, the federal interagency group preferred not to meet as frequently as the state committee once the agency representatives had an opportunity to articulate their particular interests and concerns. The federal group is chaired by the Army Corps of Engineers and includes representatives of the U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, the Massachusetts Division of Water Pollution Control, and the Massachusetts Office of Coastal Zone Management.

Interest Groups Review

In addition to the governmental agency reviews, both proponents discussed their master plans with many special interest groups, among them the Boston Society of Architects, The Boston Harbor Associates, and the Boston Preservation Alliance.

■ Development of Lesser-Scale Alternatives

Following the first round of public review of the Initial Master Plans, the developers examined the reactions to the project designs, and then each began to formulate a Lesser-Scale Alternative as required by the MEPA scope. The two alternatives responded specifically to the public concerns about building height, massing, visual access, and location of water transportation facilities. These Lesser-Scale Master Plans, shaped through the ongoing review process, are presented in this Draft EIR along with the Initial Master Plans and the No-Build Alternatives for the Fan Pier Development and the Pier 4 Development.

In reviewing each of the future build scenarios, it should be remembered that these are master plans, which provide the basic overall concepts for the massing, heights, and layout of buildings, but do not present such details as building materials, fenestration, and landscaping. Even with master plan approval from the city, each proposed building will be subject to design review by the BRA, subsequent submissions (as appropriate) to the MEPA Unit of the Executive Office of Environmental Affairs, and the requirements of other agencies issuing environmental permits and approvals.

ALTERNATIVE 1: NO-BUILD

■ Fan Pier No-Build

The No-Build Alternative for Fan Pier assumes the current parking, storage, sandwich shop, and excursion boat uses on the site would continue in the short-term. However, the ongoing deterioration of the pile-supported pier on the west side of the site and of the seawall structure on the east side of the site could preclude the utilization of this area in the future unless major repair/stabilization efforts are undertaken. Figure III-1 presents current views of the development site.

The existing permit for parking on the Fan Pier allows 1,500 public spaces. A shed, located on the site, houses the ticket operations for the parking lot. Marine functions on the Fan Pier include the operation of an excursion boat run by A.C. Cruise Lines during the summer months. This excursion operation offers a daytime trip to Gloucester six days a week, a whale watch trip on Saturdays, and special function evening charters for parties, business trips, and weddings. A.C. Cruise Lines has a tenancy-at-will lease agreement with the owner of the Fan Pier site. A.C. Cruise Lines leases docking space along the Fan Pier at the mouth of the Fort Point Channel, both for its excursion boat and for a tugboat that houses support services necessary to the operation.

Currently the Fan Pier is underutilized, devoted mainly to parking and excursion boat services. No public space or walkways invite active pedestrian use and enjoyment of the site. Furthermore, the array of vehicles parked on the site during the week detracts from the visual appeal of the waterfront, and is not consistent with city and state goals to provide public access and active uses along Boston's harborside.

■ Pier 4 No-Build

Anthony's Pier 4 Restaurant located at the northernmost tip of the pier, a small attached fish market, and the associated at-grade parking for 750 cars will be continued in the No-Build Alternative. To assure the long-term success of these businesses, continuing

FIGURE III-1
Project Sites
Today

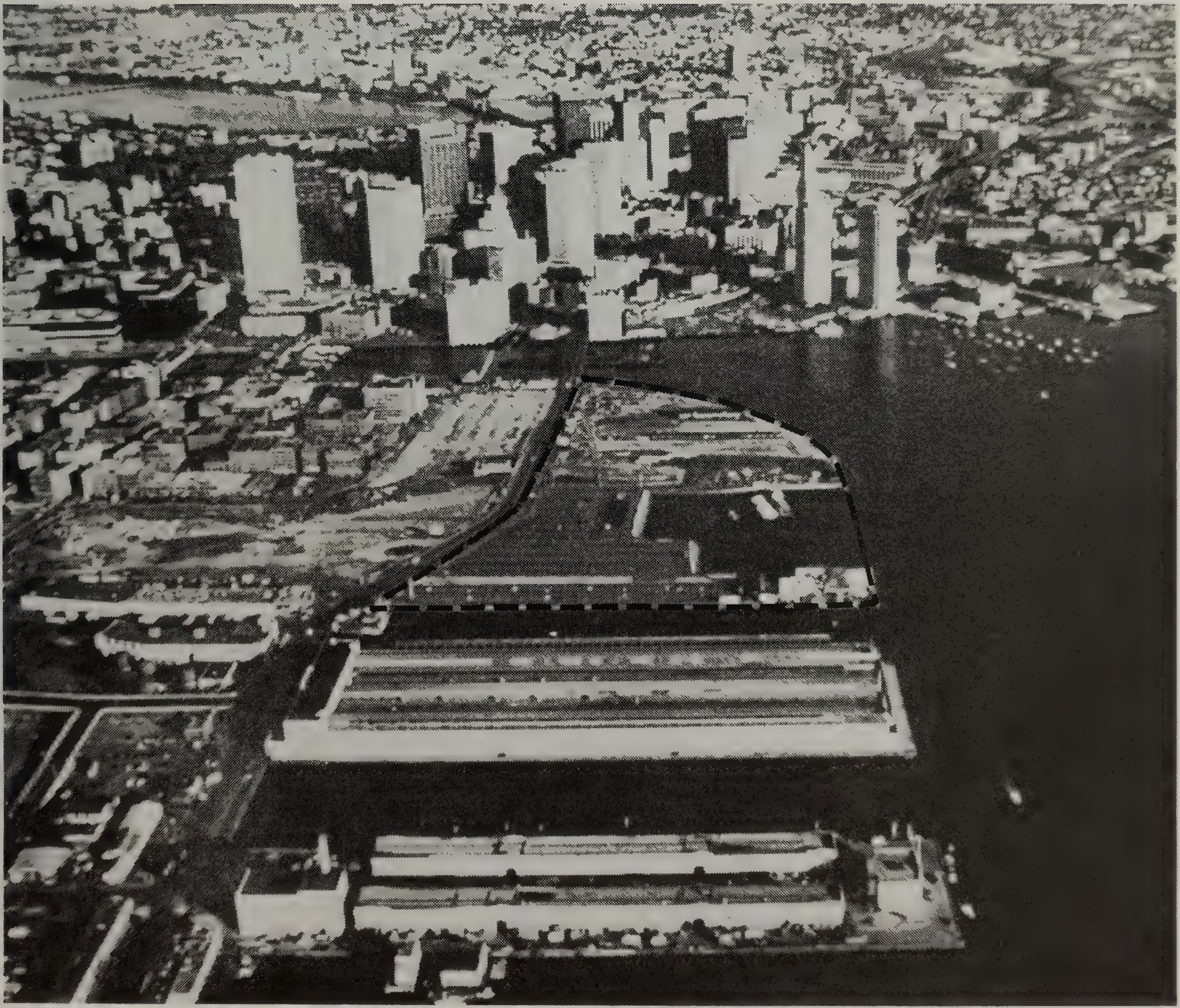
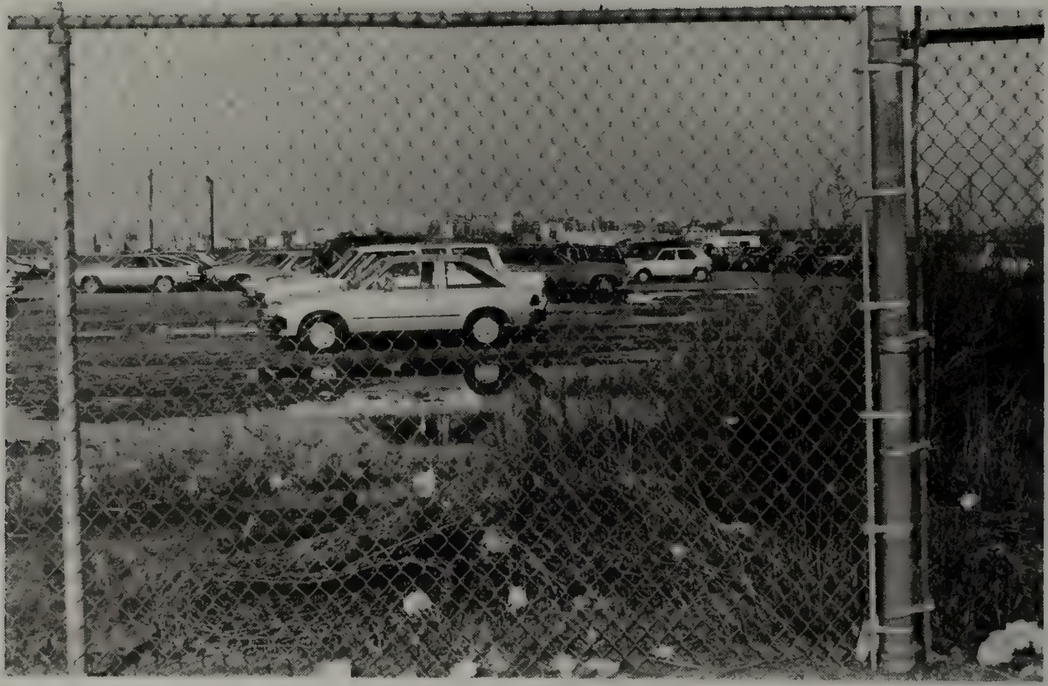


FIGURE III-1
(Continued)
Project Sites
Today

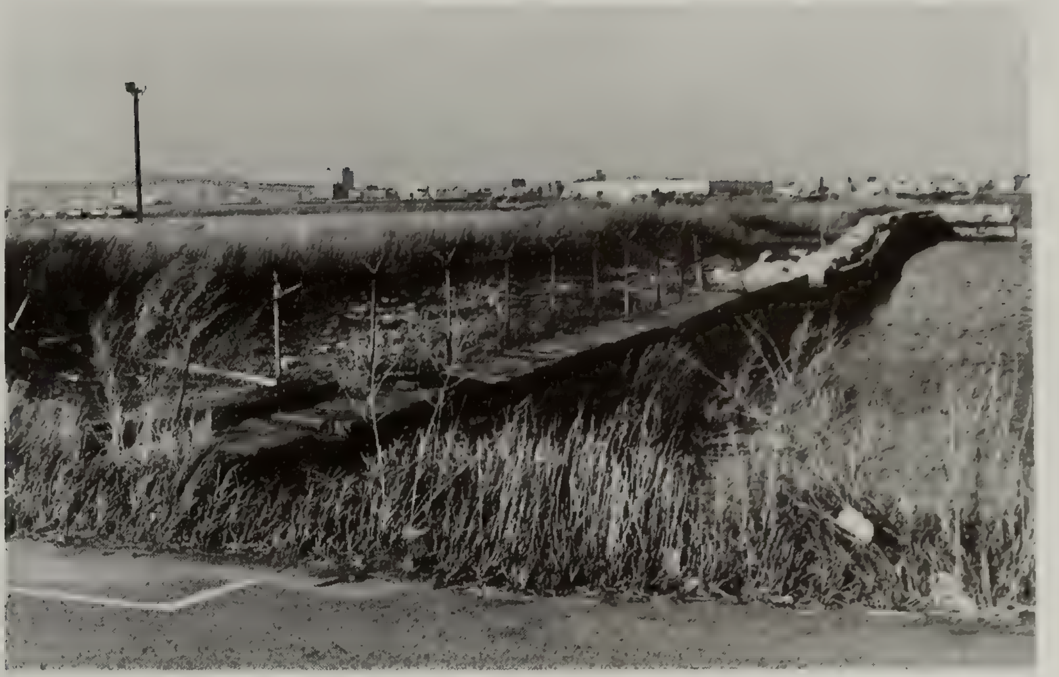


Fan Pier parking lot as seen from Northern Avenue.

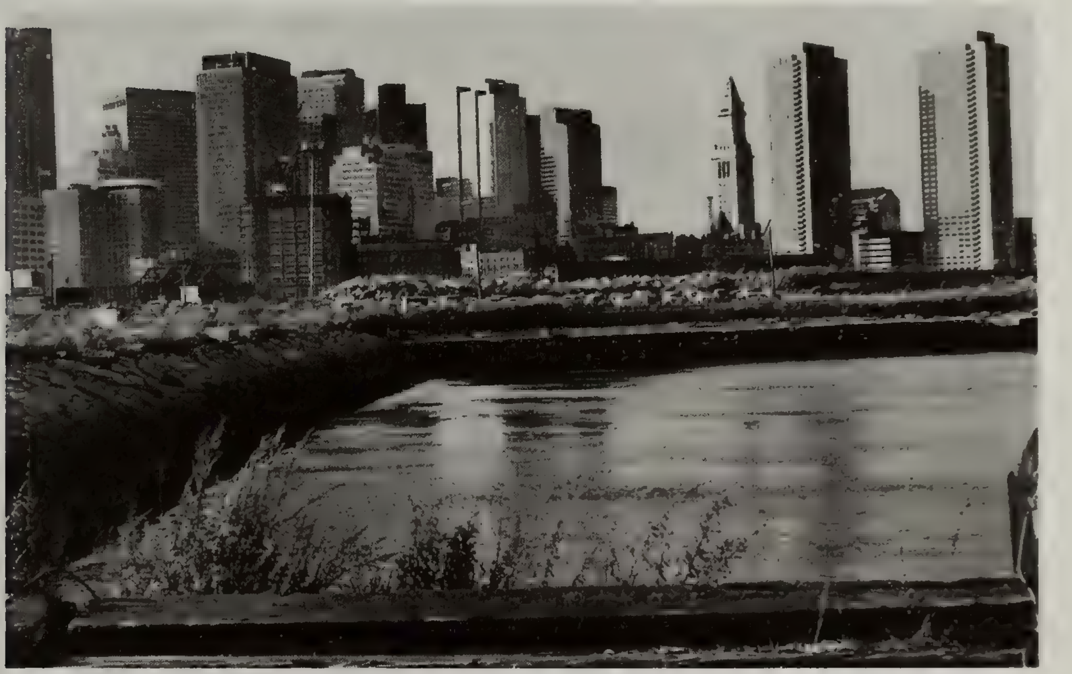
Fan Pier parking lot with Boston Wharf Company buildings in background.

West side of Fan Pier as seen from Northern Avenue Bridge. Excursion boat landing, surface parking, and warehouse structure are visible.

FIGURE III-1
(Continued)
Project Sites
Today



Failing seawall on east side of Fan Pier.



Downtown Boston, Fan Pier, riprap seawall, and inlet as seen from Fan Pier.

Entrance to Pier 4 with Anthony's Pier 4 Restaurant at left. To the right is Commonwealth Pier 5.

improvements to the restaurant, rehabilitation of the existing pier structure, and repair of the granite-block revetment will occur. Figure III-1 also presents some current views of the Pier 4 site.

ALTERNATIVE 2: INITIAL MASTER PLANS

■ Fan Pier Initial Master Plan

The Fan Pier Initial Master Plan proposed by HBC Associates will establish an active mixed-use development on Fan Pier (see Figure III-2). Public open space will constitute approximately 50 percent of the Fan Pier site. Approximately 3.4 million s.f. of space will be constructed above grade to house residential, retail, office, and hotel uses, with 2,500 below-grade parking spaces. A 90-foot-wide canal will be constructed east to west across the site bringing water to the interior of the site. Three South Boston streets--Sleeper, Farnsworth, and Pittsburgh--will be extended across Northern Avenue onto the site. Vehicular bridges will connect Farnsworth and Pittsburgh Streets with the north side of the canal. Five office buildings, including one that will accommodate marine-related services in the lower levels, will occupy the site south of the canal. On the north side of the canal will be three residential buildings and a major hotel. Buildings along the canal will house retail uses at the ground level to create an active pedestrian environment.

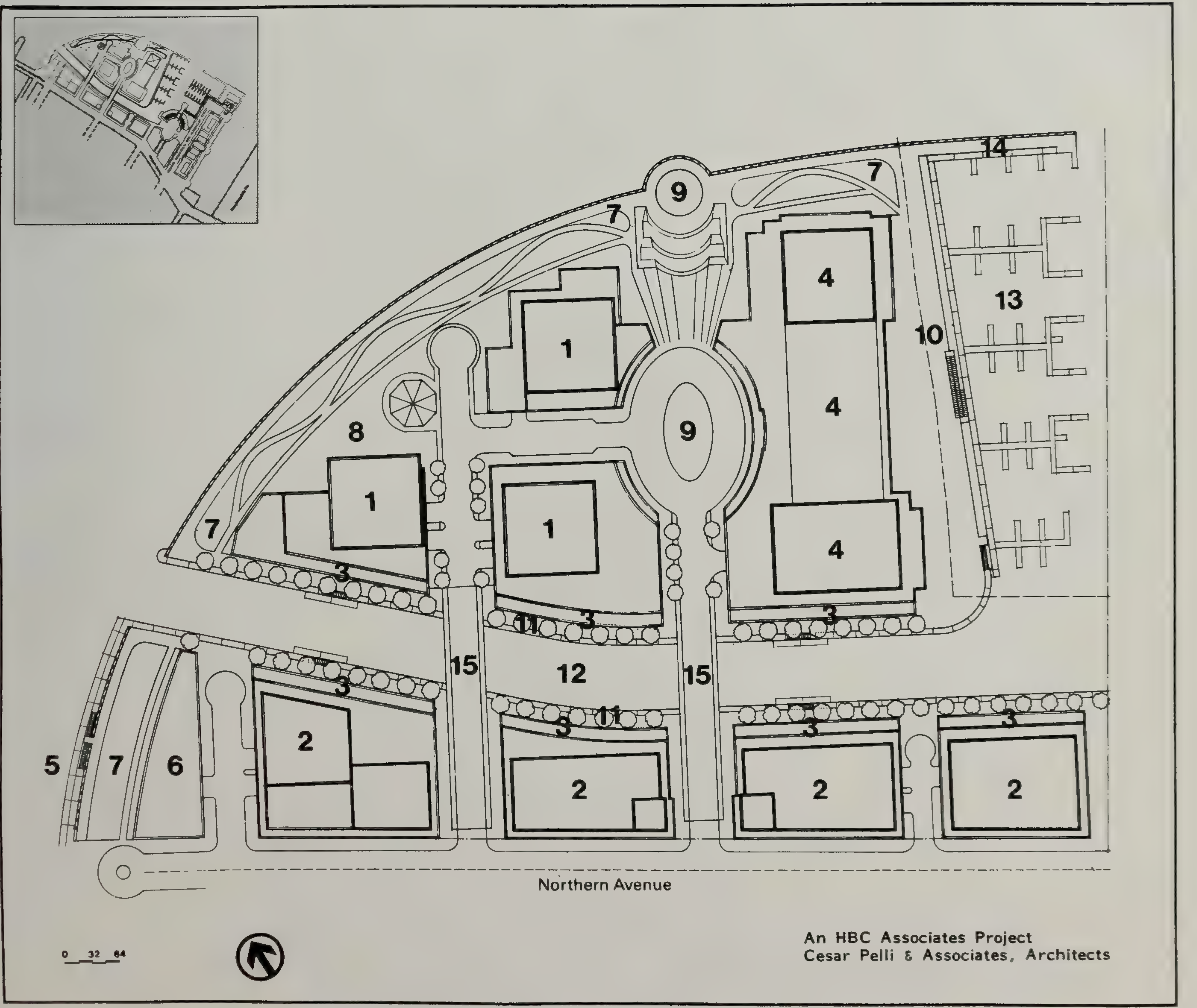
Development will be phased over a ten-year period between 1986 and 1995. The first phase will include the construction of infrastructure, the hotel, and portions of the office, residential, and retail space. The remaining residential and commercial spaces will be developed in subsequent phases.

The public open space proposed in the Initial Master Plan features a 2,000-linear foot extension of the city's Harborwalk; view corridors directed out to the Inner Harbor and downtown; a new canal; water transportation services and facilities; a marina jointly developed by the two projects; and a waterfront park.

The length of Harborwalk along the water's edge of Fan Pier will be designed with appropriate dimensions, lighting, benches, railings, and landscaping in accordance with the city's Harborpark design guidelines. The grid organization of the streets on the site and the orientation of the canal aligned with the Custom House Tower will provide additional view corridors to the Inner Harbor and downtown. The new canal, which will be lined with retail arcades, will support floating docks on both sides and permit two-way passage along the entire length of the canal. Docking space, ticketing, and passenger waiting services will be provided for commercial passenger boats along the

FIGURE III-2
Fan Pier Initial
Master Plan
Proposal

1. Residential
2. Office
3. Retail Arcades
4. Hotel
5. Commercial Passenger Boat Landing
6. Marine Services/Office
7. Harborwalk
8. Public Park
9. Public Open Space
10. Marina Walk
11. Canal Walk
12. Canal
13. Marina
14. Breakwater
15. Vehicular Bridge



An HBC Associates Project
Cesar Pelli & Associates, Architects

western edge of the Fan Pier at the mouth of the Fort Point Channel. On the Fan Pier side of the marina, which will be co-developed by the two proponents, will be approximately 80 slips for recreational boats, with 10 percent of the slips allotted to transient users. A building housing marine related facilities in the lower stories will be located at the junction of the canal and Fort Point Channel to provide services and supplies to the commercial boats using the adjacent docking space. The waterfront park along the curved section of the pier will provide landscaped open space for public activities at the water's edge.

The approximate distribution of proposed uses by square foot is:

o Residential	900,000 s.f.
o General Retail	156,000 s.f.
o Office	1,480,000 s.f.
o Hotel	850,000 s.f.
Total Program	3,386,000 s.f.

Other major site uses proposed include:

o Marina, jointly developed with Pier 4	approx. 80 slips on the Fan Pier side
o Canal	121,280 s.f.
o Harborwalk	2,000 l.f.
o Canal Promenades	2,000 l.f.
o Underground Parking	2,500 spaces

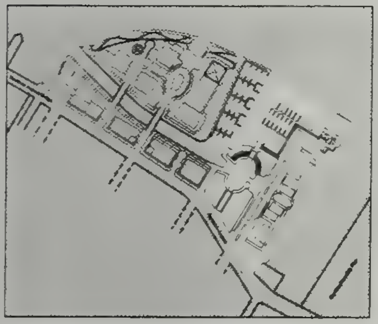
■ Pier 4 Initial Master Plan

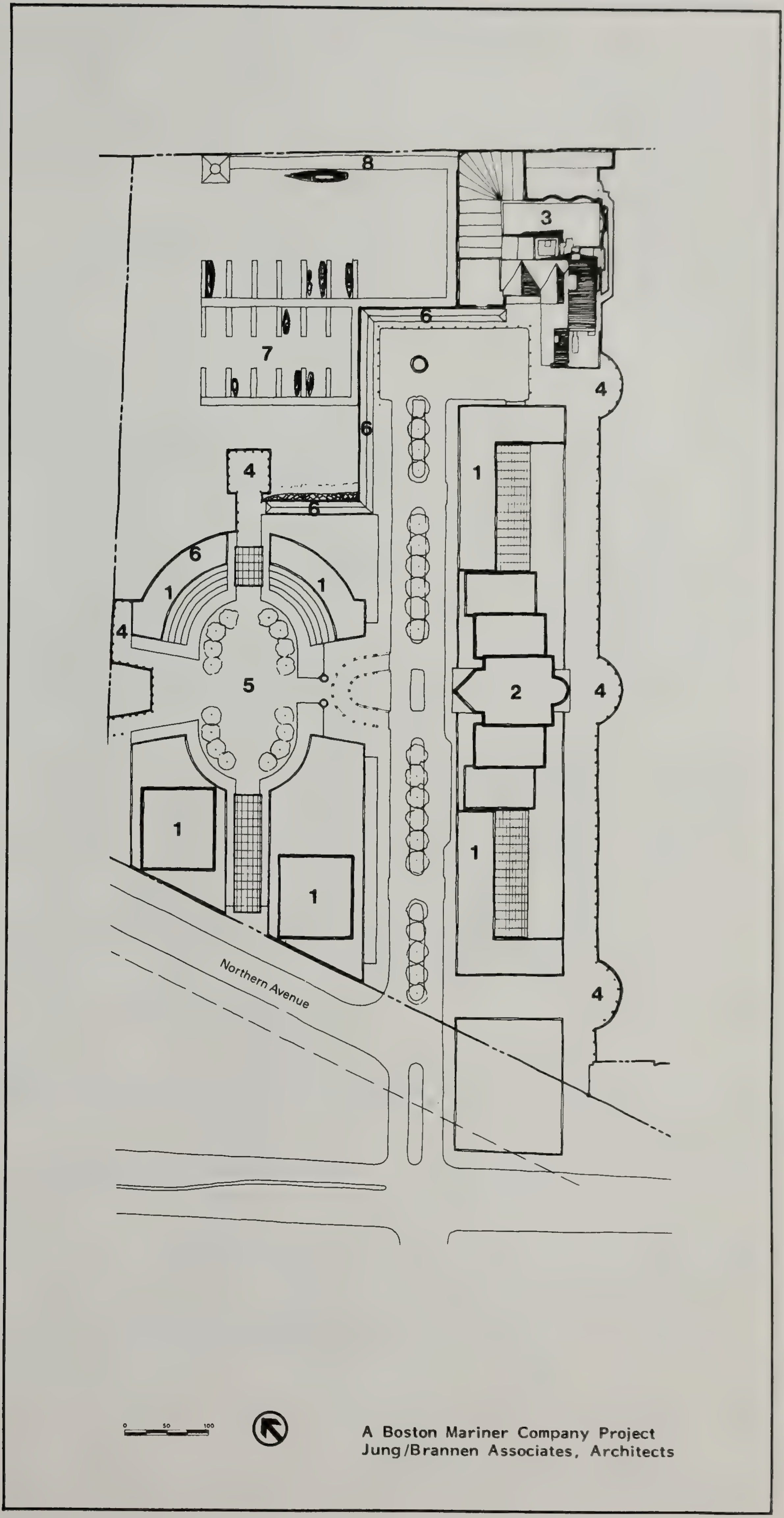
The Initial Master Plan proposed by the Boston Mariner Company for Pier 4 consists of an active mixed-use waterfront development (see Figure III-3). Development above grade will total 1.7 million s.f. of residential, retail, office, and hotel space. Below-grade parking facilities will accommodate 2,200 cars including parking to meet the demands of Anthony's Pier 4 Restaurant. Over 50 percent of the site will be devoted to public open space.

A single roadway is proposed to run the length of Pier 4. At its furthest extent, this roadway will provide both turnaround space for automobiles going to Anthony's Pier 4 Restaurant, and vehicular access to the marina for yacht provisioning and emergencies. Additional pile-supported decking at the northwest end of the pier will accommodate this portion of the roadway. Proposed south of the restaurant is a long building covering more than one half of the pier's

FIGURE III-3
Pier 4 Initial
Master Plan
Proposal

1. Residential/Office/Retail
2. Hotel/Retail/Restaurant/Residential
3. Existing Restaurant
4. Harborwalk with Viewing Platforms
5. Public Plaza
6. Pedestrian Walkways and Arcades
7. Marina
8. Breakwater





A Boston Mariner Company Project
Jung/Brannen Associates, Architects

length and housing hotel, residential, and commercial uses. An office building will be constructed at the Northern Avenue end of the pier. West of the road will be a cluster of mixed-use residential and commercial buildings that define the rounded corners of an oval common space located adjacent to the end of the Fan Pier canal.

In the Initial Proposal, the development of Pier 4 will take place in three phases between 1987 and 1995, beginning with the hotel/office/residential building along the eastern edge of the pier.

Major public features of the Initial Proposal Master Plan for the Pier 4 Development include a 2,000-foot extension of Harborwalk along the site's waterfront to Commonwealth Pier 5, viewing platforms, a marina jointly-developed with Fan Pier, and a landscaped public common and entry roadway. The segment of the Pier 4 Harborwalk in the Initial Proposal will extend along the water's edge except at Anthony's Pier 4 Restaurant, which is situated too close to the north end of the pier to allow a walkway behind the building. Appropriate walkway dimensions, lighting, benches, railings, and landscaping will be provided along the Pier 4 Harborwalk in accordance with the city's Harborpark design guidelines. A platform at the base of the marina will provide pedestrians with views of the harbor, as will smaller platforms on the east side of the site. The co-developed marina, containing approximately 60 slips on the Pier 4 side, with 10 percent available for transient boaters, will be accessible to pedestrians and handicapped users via ramps and floating quays. The landscaped public common will provide a link across the site from the hotel building central arcade to the eastern end of the Fan Pier canal. A cut in the pier edge opposite the canal will serve as a visual terminus to the canal. Harbor fill is proposed to form a gentle curve at the marina edge of the common, allowing arcade areas from which pedestrians can view the marina at the base of the residential building.

The approximate distribution of program uses by square foot is proposed as follows:

o Residential	767,000 s.f.
o General Retail	196,000 s.f.
o Office	597,000 s.f.
o Hotel	175,000 s.f.
Total Program	1,735,000 s.f.

Other major site uses proposed include:

o Marina, jointly developed with Fan Pier	approx. 60 slips on the Pier 4 side
o Public Open Space	229,000 s.f.
o Harborwalk	2,000 l.f.
o Underground Parking	2,200 spaces

ALTERNATIVE 3: LESSER-SCALE MASTER PLANS

Public reactions to the Initial Master Plans for both sites suggested the designers had captured a character sympathetic with city and state waterfront land use policies, which had been absent from the original ENF plan (see ENF Appendix). However, some comments on the Initial Proposals addressed specific design issues, including building height, building arrangement, public open space accessibility, pedestrian and vehicular circulation, and water transportation facilities and uses. These considerations echoed those in the MEPA scope request for a Lesser-Scale Alternative, with particular emphasis on building height.

Each development's Lesser-Scale Alternative proposes a building layout that provides a more open feeling at the water's edge by lowering building height or redistributing building bulk. These reconfigurations improve view corridors to the harbor and downtown. Public amenities such as the jointly-developed marina, water transportation services and facilities, walkways and arcades including Harborwalk, and parks and landscaped areas are better defined in the Lesser-Scale Master Plans than in the Initial Proposals.

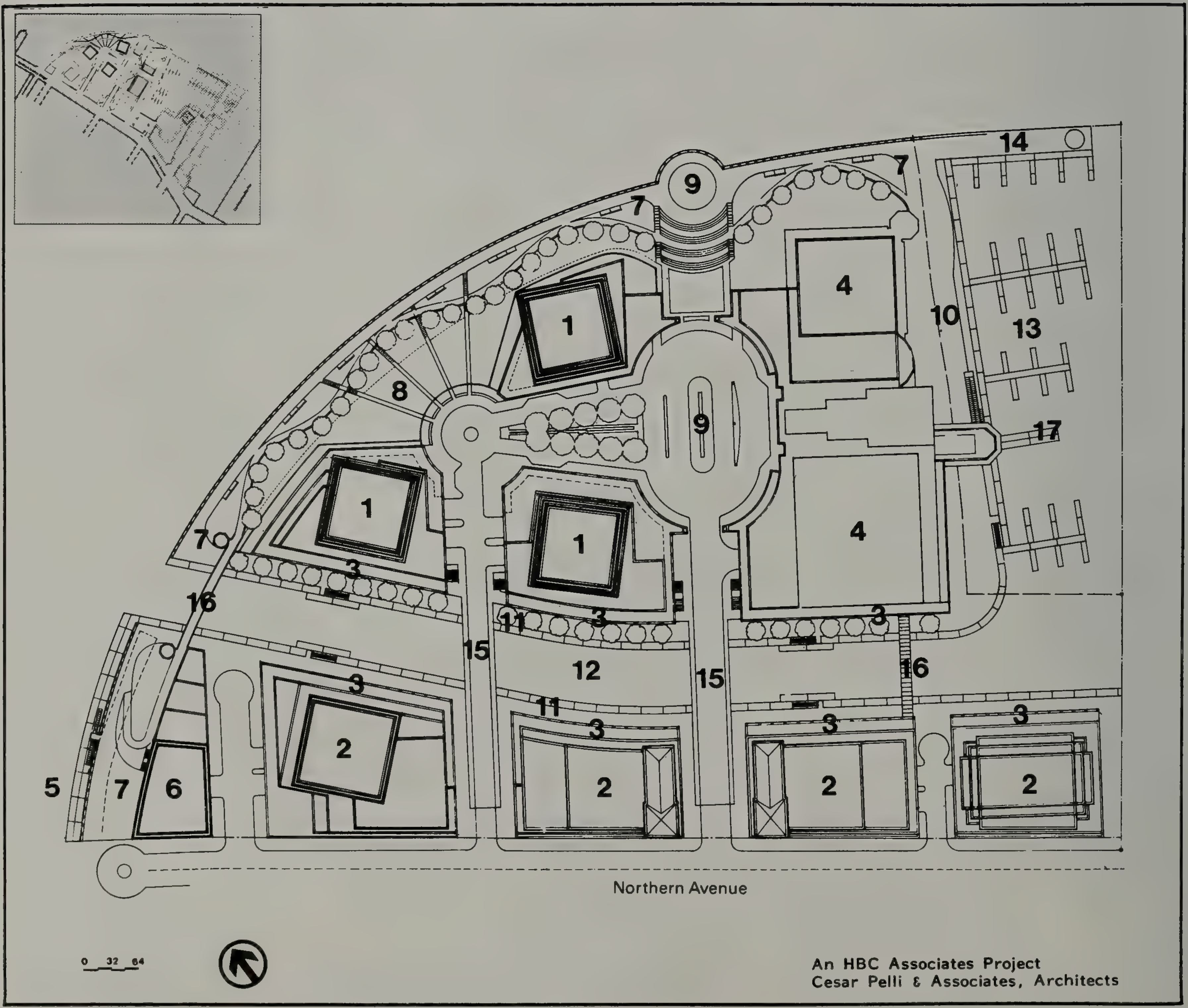
■ Fan Pier Lesser-Scale Master Plan

The majority of public comments on the Fan Pier Initial Proposal related to the heights of the residential buildings closest to the water's edge on the north side of the canal. Under the Fan Pier Lesser-Scale Alternative (see Figure III-4), the heights of these buildings will be lowered. While some of the mass from the lowered heights will be redistributed to buildings along Northern Avenue, approximately 139,000 s.f. will be cut from the program. The following redistribution of square footage for the Fan Pier Lesser-Scale Alternative reflects this decrease in program:

o Residential	834,000 s.f.
o General Retail	79,000 s.f.
o Office	1,480,000 s.f.
o Hotel	854,000 s.f.
Total Program	3,247,000 s.f.

FIGURE III-4
Fan Pier Lesser-Scale
Master Plan Alternative

1. Residential
2. Office
3. Retail Arcades
4. Hotel
5. Commercial Passenger Boat Landing
6. Marine Services/Office
7. Harborwalk
8. Public Park
9. Public Open Space
10. Marina Walk
11. Canal Walk
12. Canal
13. Marina
14. Breakwater
15. Vehicular Bridge
16. Pedestrian Bridge
17. Airport Shuttle Landing



An HBC Associates Project
Cesar Pelli & Associates, Architects

The Lesser-Scale Alternative further emphasizes the project's special opportunity to extend the vitality of city blocks, express the fan shape of the pier, and respect its waterfront location. In the Lesser-Scale Alternative, the building masses along the canal will be realigned to face the banks of the canal. Along Northern Avenue the buildings will step back more distinctly, respecting the massing of the Boston Wharf Company buildings and lessening the "wall effect" along the street's edge. The hotel building will be readjusted to reduce bulk by eliminating the smaller tower along the canal, and increasing the height of the tower at the north end of the site. This taller tower of more slender proportions will serve as a "beacon" on South Boston's waterfront at the mouth of the Fort Point Channel. In response to public requests for continuous access along the water's edge, new pedestrian bridges are proposed for each end of the canal, in addition to the two vehicular bridges included in the Initial Proposal, which cross the canal at Pittsburgh and Farnsworth Streets. The pedestrian bridge at the western end of the canal at Fort Point Channel will be served by an elaborate ramp specifically designed for handicapped access.

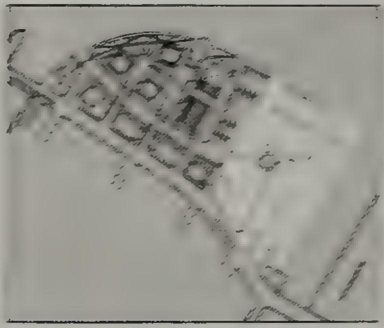
■ Pier 4 Lesser-Scale Master Plan

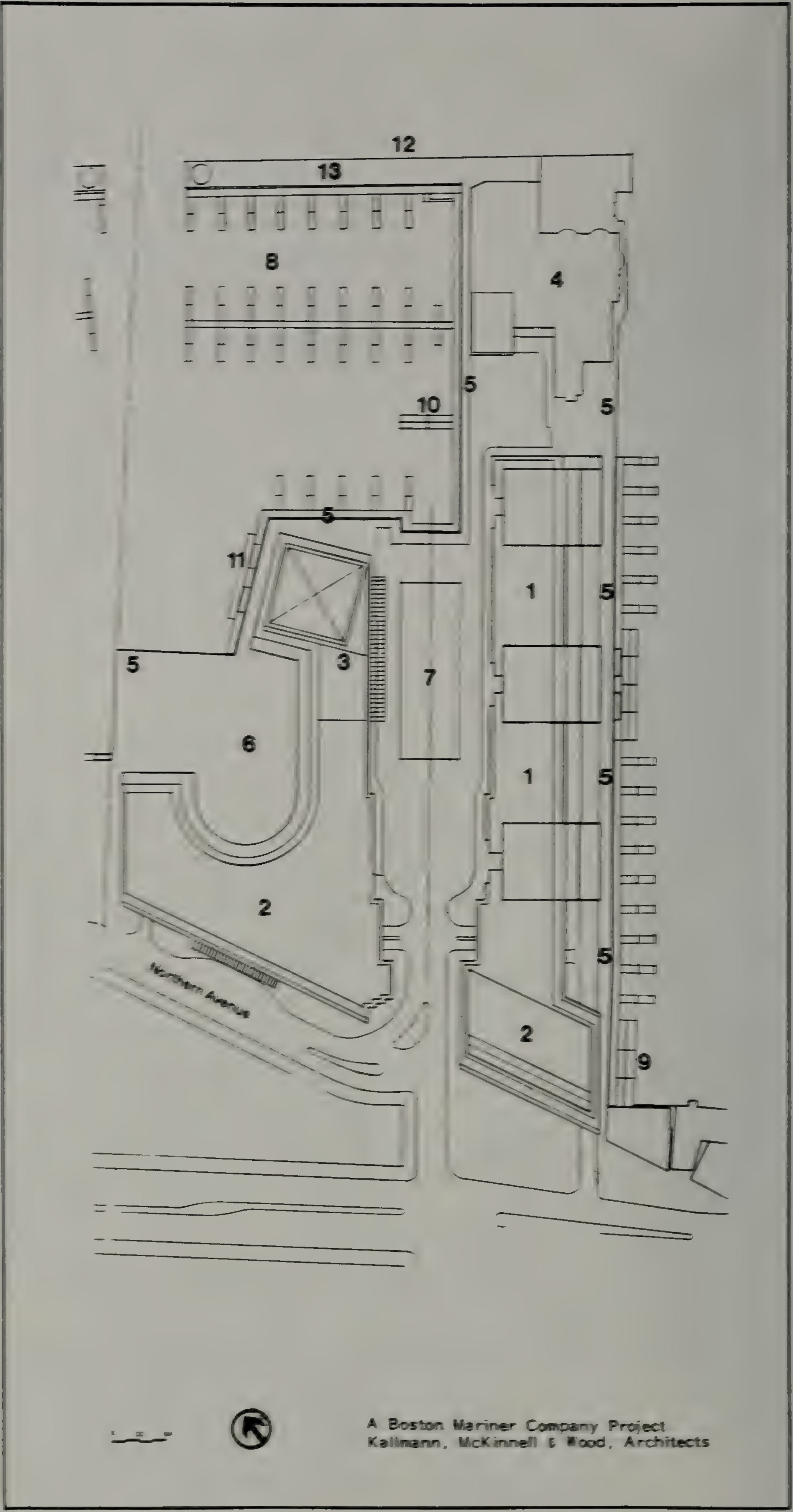
Concerns about the fill and pile-supported decking in the Initial Pier 4 Proposal, coupled with specific comments on the inaccessibility of the public space at the harbor's edge and the lack of water-dependent uses from such groups as the CAC, the BRA Urban Design Committee, and the State Interagency Coordinating Committee, led to the preparation of a Lesser-Scale Alternative Master Plan by the Pier 4 Development's newly selected design architect. The resulting Lesser-Scale Alternative, a totally new design (see Figure III-5), will accommodate the same uses and total square footage as the Initial Proposal and retain the plan's basic strengths, such as public access along the water's edge and building heights that generally respect the Pier and Bulkhead line. However, in response to specific comments on the Initial Proposal, the Lesser-Scale Alternative will provide more openness and accessibility at the pedestrian level, eliminate the need for any new filling of Boston Harbor, and open the common area at the marina's edge to more sunlight, and better views, while making it a clear terminus to the Fan Pier canal.

In creating a more spacious, open ground plan, the allocation of uses specified in the Initial Proposal will be shifted in the Lesser-Scale Alternative. The hotel will become a focal point at the base of the marina, while a low curved office building will provide definition to a major public open space overlooking the Fan Pier canal and the marina. The road will remain

FIGURE III-5
Pier 4 Lesser-Scale
Master Plan Alternative

1. Residential Retail
2. Office Retail
3. Hotel Residential
4. Existing Restaurant
5. Harborwalk
6. Public Plaza
7. Entry Pool
8. Marina
9. Marina Loading Dock
10. Public Dinghy Dock
11. On-Demand Water-Taxi Landing
12. Coastal Cruise Ship Landing
13. Breakwater





A Boston Mariner Company Project
Kallmann, McKinnell & Wood, Architects

down the center of the pier, but the sense of its extent will be shortened by half from the Pier 4 Initial Proposal. A water feature proposed for the middle of this entry roadway, will bring a sense of water into the site's interior.

In the Lesser-Scale Alternative, the building extending along Pier 4 will be a residential complex with a low base topped by three taller elements that step up away from the water's edge toward Northern Avenue. Anthony's Pier 4 Restaurant will remain at the north end of the residential complex. An office building will be sited at the south end of the Pier along Northern Avenue.

To complement the Harborwalk, and mark Pier 4 as the southernmost point along the 7-mile public walk, the plan also proposes maritime displays and exhibits on the history of Boston's waterfront. In addition, in the Lesser-Scale Alternative, the marina will be expanded and a variety of water transportation services and facilities proposed, including a landing for coastal cruise ships, an on-demand water-taxi, a provisioning dock for offloading boating equipment from vehicles, and a public dinghy dock.

The phasing of this alternative differs fundamentally from the Initial Master Plan. In the Lesser-Scale Master Plan, the parcels on the west side of the pier closest to Fan Pier will be constructed in the first phase along with 1,200 underground parking spaces. The residential and office buildings along the pier are proposed to be built in the later phases. This phasing will reduce construction disruption and create immediate physical links to the public amenities created in the first phase of the Fan Pier Development.

IV-VI

Environmental Issues

Chapters IV, V, and VI present 12 environmental categories requested for evaluation by the Secretary of Environmental Affairs in the MEPA scope issued jointly for the Fan Pier and Pier 4 Developments (see the Scope Appendix). Each chapter is organized around a major aspect of development and related impacts:

- Chapter IV concentrates on environmental effects associated with transportation characteristics of the proposed projects and other South Boston developments. These Traffic-Related analyses are: TRAFFIC AND PARKING, AIR QUALITY, and NOISE. In this chapter, the analyses are based on maximum programmatic development area as reflected by each project's Initial Master Plan Proposal.

- Chapter V examines Design-Related Issues for the Fan Pier and Pier 4 master plans, including: VISUAL QUALITY, SHADOW, WIND, TIDELANDS AND PUBLIC PURPOSE, PUBLIC ACCESS, and WATER-RELATED ACTIVITIES.

- Chapter VI assesses the impacts related to Construction and Operations for the projects, including WATER QUALITY, INFRASTRUCTURE, and plans for CONSTRUCTION.

IV.1

Traffic-Related Issues

Traffic and Parking

INTRODUCTION

The purpose of this analysis is: to describe the use of existing roadway, parking, and transit facilities serving the South Boston area; to characterize existing state and city plans for upgrading these systems and facilities; to assess the effects of the Fan Pier and Pier 4 Developments on existing and future transportation systems in 1990 (midpoint of the developments) and 1995 (completion of the developments); and to examine measures to mitigate adverse impacts. Additional descriptions, data and computations are presented in the Traffic Appendix.

Estimates of travel demands for the Fan Pier and Pier 4 Developments are based upon the proposed programmatic uses for the two projects. The results of seven separate transportation analyses are presented in this chapter, responding to the MEPA Scope and subsequent correspondence:

1. 1985 -- Existing Conditions
2. 1990 -- No Build (without Third Harbor Tunnel)
3. 1990 -- Phase I Development of Fan Pier and Pier 4 (without Third Harbor Tunnel)
4. 1995 -- No Build (with Third Harbor Tunnel)
5. 1995 -- Completed Development of Fan Pier and Pier 4 (with Third Harbor Tunnel)
6. 1995 -- No-Build (without Third Harbor Tunnel).
7. 1995 -- Completed Development of Fan Pier and Pier 4 (without Third Harbor Tunnel)

For the 1990 and 1995 analysis years, transportation forecasts include demand from existing and likely new land uses in the northern commercial/industrial area of South Boston and in downtown.

For the purposes of this traffic impact assessment, the Initial Proposal Master Plan for Fan Pier is examined. As explained below, traffic demands are predicted on the basis of programmatic area of new development. Since the Fan Pier Initial Proposal has approximately 100,000 SF more programmatic area than the Fan Pier Lesser-Scale Alternative, the Initial Proposal represents a worst-case scenario for traffic. The Pier 4 Initial Proposal Master Plan and Lesser-Scale Alternative are comparable in their traffic-generating characteristics, and thus they are not treated separately for this analysis.

The results of this impact assessment -- particularly the development-related changes to traffic flows at the intersections analyzed -- form the basis of the impact assessments for Air Quality (Section IV.2) and Noise (Section IV.3).

The Traffic and Parking portion of the Draft EIR is organized into several major sections. These are listed below, along with the general content of each section.

Introduction. The Introduction includes general background information to set the context of the Traffic and Parking analysis, defines the study area and traffic analysis locations, and outlines the general methodology used in the traffic and parking analysis.

Description of the Environment. This section provides information on current transportation-related conditions within the study area. Three topics are discussed: (1) traffic conditions along streets, highways, and the main analysis locations, along with planned improvements to the roadway system; (2) the public transportation system, including rapid transit, local and express bus, commuter rail and commuter boat, plus any planned improvements to public transport services; and (3) parking facilities on or near the project site.

Probable Project Impacts. The Impacts section begins with an estimate of person and vehicular travel demands created by the projects in 1990 and 1995. This is first done for travel which is unconstrained by parking supply, then again in the more likely case where vehicular travel is constrained by the lack of parking availability. Trips from other background developments likely to be built are also estimated. The distribution of trips to various geographic corridors around the site is then presented followed by the identification of impacts on roadways, parking facilities, and the public transportation system. Several scenarios are analyzed, including 1990 with and without the projects, 1995 with and without the projects but with no Third Harbor Tunnel/Depressed Central Artery/ Seaport Access Road, and 1995 with and without the projects but assuming that the proposed Seaport Access Road system is in place. Impacts during project construction are also discussed in this section.

Mitigation Measures. Based on the identification of impacts with and without the Seaport Access Road system, a comprehensive program of measures to mitigate these impacts is presented in three general categories: (1) Demand Reduction/Management, (2) Traffic Operations Improvements, and (3) New Roadway Capacity. Roadway, transit, and parking-related measures are discussed, along with the identification of the party responsible for implementation and, where possible, the probable effect on traffic operations within the study area.

■ Fan Pier and Pier 4 Developments

The South Boston area immediately across the Fort Point Channel from downtown Boston has in recent years received a high degree of real estate developer interest. Within this area, the proposed development of the Fan Pier and Pier 4 will create approximately 2.4 million square feet of office and retail space, 1,250 hotel rooms and 1,100 residential units, all to be constructed within the next ten years.

With the exception of parking, all of the proposed development on the Fan Pier represents new uses. The proposed Pier 4 development site currently contains only Anthony's Pier 4 Restaurant and its associated parking area. Anthony's Pier 4 Restaurant will remain, but the existing parking facilities will be removed to make room for the project. Table IV.1-1 summarizes the anticipated development plans for the Initial Build condition in 1990 and for Full Build in 1995. It should be noted that the 1990 program is not a formal plan of development, but rather the best estimate available at this time of the magnitude of development likely.

TABLE IV.1-1
Proposed Development Program

Phase	Office (sq. ft.)	Retail (sq. ft.)	Hotel (rooms)	Residential (units)	Parking (spaces)
1990 Initial Build (Phase I)					
Fan Pier	547,000	15,000	900	230	1,100
Pier 4	225,000	55,000	250	150	1,140
Total	772,000	70,000	1,150	380	2,240
1995 Full Build					
Fan Pier	1,480,000	156,000	1,000	600	2,500
Pier 4	597,000	197,000	250	500	2,200
Total	2,077,000	353,000	1,250	1,100	4,700

■ Study Area

The transportation analysis encompasses a relatively large area of South Boston and adjacent sections of downtown

Boston as shown in Figure IV.1-1. The shaded area on the map represents the primary analysis area for the study. It is one of the most comprehensive study areas designated for a MEPA EIR report. Twenty-one key locations along the major commuter routes through this area have been chosen for analysis and are shown in Figure IV.1-1. Other streets and intersections will be impacted by the project. However, the selected routes and analysis locations include those which are most seriously impacted, and thus provide adequate data for assessing project impacts and travel conditions expected on a typical commuting day.

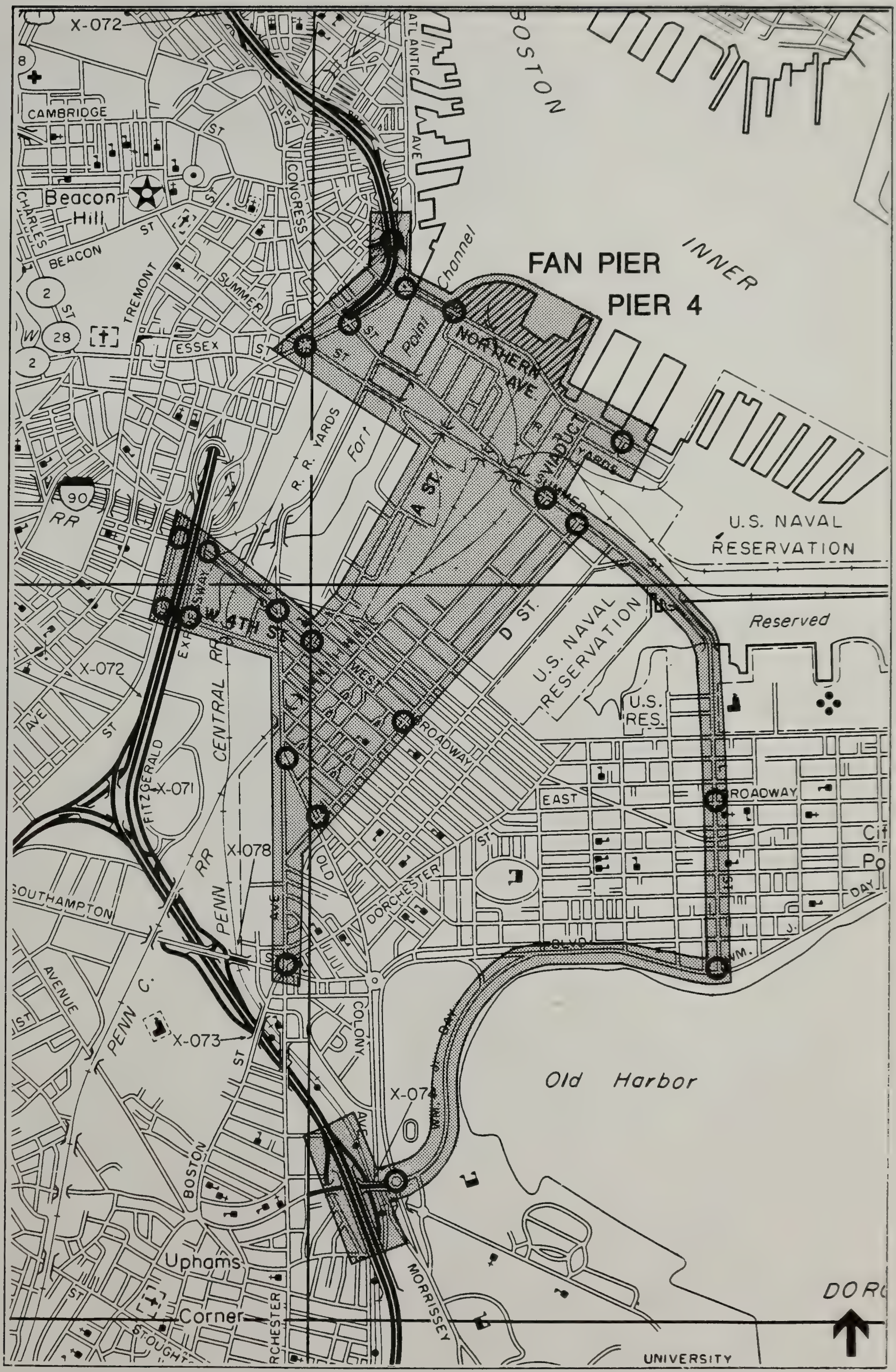
Public transportation directly serving the site is currently limited to two local bus routes. The nearest rapid transit stations are located at South Station (Red Line) and Aquarium (Blue Line). Commuter rail and express bus services are also available from South Station.

Land use within the study area is a mix of commercial, office, retail, residential, warehouse and marine-related properties. The Fan Pier site is dominated by a large, inexpensive ($3.00 per day) commuter parking lot. Anthony's Pier 4 restaurant and its related parking occupy the Pier 4 site. The immediate vicinity includes parking lots, Commonwealth Pier 5, industrial/warehouse properties, and vacant land. Commonwealth Flats, the Fish Pier, and the Boston Marine Industrial Park are situated to the east. Immediately across the Fort Point Channel is the Financial District with the office, commercial, and retail developments of the Central Business District nearby. Much of the property along the Fort Point Channel in South Boston is changing in character due to development associated with the area's proximity to downtown.

■ Study Methodology

The transportation study was conducted in three distinct steps. Step I inventoried the existing travel demand characteristics in the area. The inventory included researching previous transportation reports as well as conducting new observations of area travel demands. Observations of traffic volumes were conducted at the locations shown in Figure IV.1-1 during the morning and evening peak travel hours. Roadway volumes were recorded over 24-hour periods. (Detailed traffic count data are included in the Traffic Appendix). In addition, data for transit line performance and ridership were researched from MBTA files to identify existing and future transit service. Certain data available from previous planning studies and EIRs in the area were verified by means of recounts at selected locations in 1985. The existing transportation network served as a base condition for subsequent analysis.

FIGURE IV.1-1
Traffic Study
Area



▨ Study Area

● Analysis Locations

Step II of the study built upon the data base in Step I and established the framework for evaluating the transportation impacts of the proposed projects. In this step, travel demand forecasts for the proposed development projects were determined along with forecasted demands created by other likely future developments in the area. Estimates were made for both vehicular and mass transit modes.

The final analysis step evaluated impacts of the project on each element of the transportation system, both with and without the proposed Central Artery/Third Harbor Tunnel project. It then identified measures necessary to mitigate any adverse transportation impacts.

It should be noted that the traffic analysis was conducted assuming that the entire Central Artery/Third Harbor Tunnel/Seaport Access Road system will be in place by the 1995 analysis year. This was done to be in conformance with MEPA's desire to do the analysis with and without this important project. It is recognized, however, that recent events related to this project have resulted in some uncertainty as to its timing, or even whether the entire project will be built as a unit. It may be that the Third Harbor Tunnel, Seaport Access Road, and Central Artery Depression will be constructed as separate items, each with a different timing and sequence than if they were one project.

It would be extremely difficult to provide in-depth analyses of all possible combinations of events. However, in general it can be stated that, based on the results of impact analyses made with and without these facilities, there would be maximum negative impacts on South Boston streets if the Seaport Access Road component was delayed or not built at all. This is so because this facility is expected to carry many vehicle trips to the entire regional highway system. If the Seaport Access Road is built in conjunction with the Depressed Central Artery but without the Third Harbor Tunnel, more severe impacts will result along Northern and Atlantic Avenues and the Central Artery to route 1 and the Callahan Tunnel. If the Seaport Access Road is built with the Third Harbor Tunnel but without the Depressed Central Artery, it is assumed that it would still have to be connected to the Central Artery at the Massachusetts Turnpike interchange, so that south and westbound traffic would still be able to avoid local streets. Therefore, the greatest negative impacts within the study area would arise from eliminating or delaying the Seaport Access Road and Third Harbor Tunnel rather than the Depressed Central Artery, although the entire project is considered very beneficial in terms of the regional context.

DESCRIPTION OF THE ENVIRONMENT

The transportation system in the vicinity of the study area is highly developed, consisting of regional highways, arterial and local streets, commuter and local bus routes, rapid transit services, and commuter rail and boat services.

■ Street System

Access/Circulation

The street system in South Boston and adjacent sections of downtown consists of both local and arterial streets and limited access highways. Regional routes serving the area include:

- The Central Artery -- the major north-south roadway through downtown. It is a limited access highway located at the western edge of the study area, providing access to I-93, the Tobin Bridge (Route 1 to I-95) and Storrow Drive; the Southeast Expressway; and the Massachusetts Turnpike Extension.
- Southeast Expressway -- a limited access highway providing the major route to the south. It is the continuation of the Central Artery south of the Dewey Square Tunnel.
- Massachusetts Turnpike Extension -- a limited access highway providing the major route to the west. It terminates at the Southeast Expressway/Central Artery at the western boundary of the study area.
- Morrissey Boulevard -- a major arterial roadway extending south from Columbia Road providing an alternative route to the Southeast Expressway and southern suburbs.

Major roadways providing access to the site across the Fort Point Channel from the downtown and through South Boston include:

- Northern Avenue -- provides direct access to the site and is a major connection across the Fort Point Channel between South Boston and downtown (at Atlantic Avenue). In South Boston, it provides access to Commonwealth Pier 5 (World Trade Center), Fish Pier 6 and the Boston Marine Industrial Park.
- Summer Street -- another major connection between downtown (at South Station) and South Boston.
- Congress Street -- the third connection across the Fort Point Channel providing access to the western part of South Boston from downtown.

- L Street/W.J. Day Boulevard -- an important South Boston collector street also currently providing a commuter route between the site (and downtown) and the Southeast Expressway and Morrissey Boulevard at Columbia Road. L Street represents the continuation of Summer Street from the vicinity of the Reserved Channel south to Day Boulevard.

- D Street -- another South Boston street which currently serves as a commuter route for traffic to the south. It runs from Summer Street just east of the Viaduct to Dorchester Avenue.

- A Street -- a South Boston street which provides commuter access to the Southeast Expressway via West Fourth Street and to the Massachusetts Turnpike Extension via the West Broadway Bridge.

A more detailed description of the street system is provided in the Traffic Appendix.

Existing Traffic Volumes

Mechanical and manual traffic counts were taken in March and April, 1985, and were supplemented with additional traffic volume data from the Central Transportation Planning Staff to form a 1985 base traffic flow network. Table IV.1-2 lists the 1985 average weekday daily traffic (AWDT), AM and PM peak hour traffic volumes, and the percent the AM and PM peak hour traffic volumes are of the daily traffic volume, at several locations. Existing daily volumes are also shown in Figure IV.1-2. Among the locations shown in Table IV.1-2, average daily traffic volumes along major routes range from a low of 8,300 vehicles per day on D Street to a high of 30,350 vehicles per day on the Summer Street Bridge.

Table IV.1-3 shows peak hour directional distribution for various two-way roadways in the study area. The table lists the locations and the percent of the peak hour traffic in the dominant direction of flow. The highest directional flow is on Northern Avenue at Atlantic Avenue where 88 percent of the evening peak hour traffic is westbound (toward downtown). As shown earlier in Table IV.1-2, this roadway also has the highest percentage of daily traffic in the evening peak hour. L Street at East Broadway has the highest directional traffic flow in the AM peak hour, with 86 percent of the traffic in the northbound direction. The same location also shows high directionality in the evening peak hour, with 74 percent of the peak hour volume moving southbound. In contrast, West Broadway at Dorchester Avenue has evenly balanced directional distribution with only 51 percent westbound in the morning and 53 percent eastbound in the evening.

TABLE IV.1-2
1985 Traffic
Volume
Summary

Location	1985 AWDT*	AM Peak Hour (vph)**	Percent of AWDT	PM Peak Hour (vph)	Percent of AWDT
Northern Avenue Bridge	17,700	1,520	8.6%	2,290	12.9%
Sleeper Street	5,400	310	5.7%	610	11.3%
Congress Street Bridge	10,500***	1,100	10.6%	780	7.5%
Summer Street Bridge	30,350	2,360	7.8%	2,110	7.0%
Broadway Bridge	29,950	2,050	6.8%	2,300	7.7%
West Fourth Street Bridge	12,200	950	7.8%	940	7.7%
Reserved Channel Bridge	17,750	1,580	8.9%	1,330	7.5%
D Street north of Cypher Street	8,300	750	9.0%	600	7.2%
East Broadway at L Street	11,900	640	5.4%	740	6.2%
W.J. Day Boulevard at I Street	21,400	1,510	7.1%	1,730	8.1%
Old Colony Avenue at D Street	25,900	2,480	9.6%	2,320	9.0%
Dorchester Avenue at Damrell Street	13,850	1,050	7.6%	1,180	8.5%

* AWDT - average weekday daily traffic.
** vph - vehicles per hour.
*** Estimate based on 1981 count.

FIGURE IV.1-2
Existing
Average
Weekday Daily
Traffic

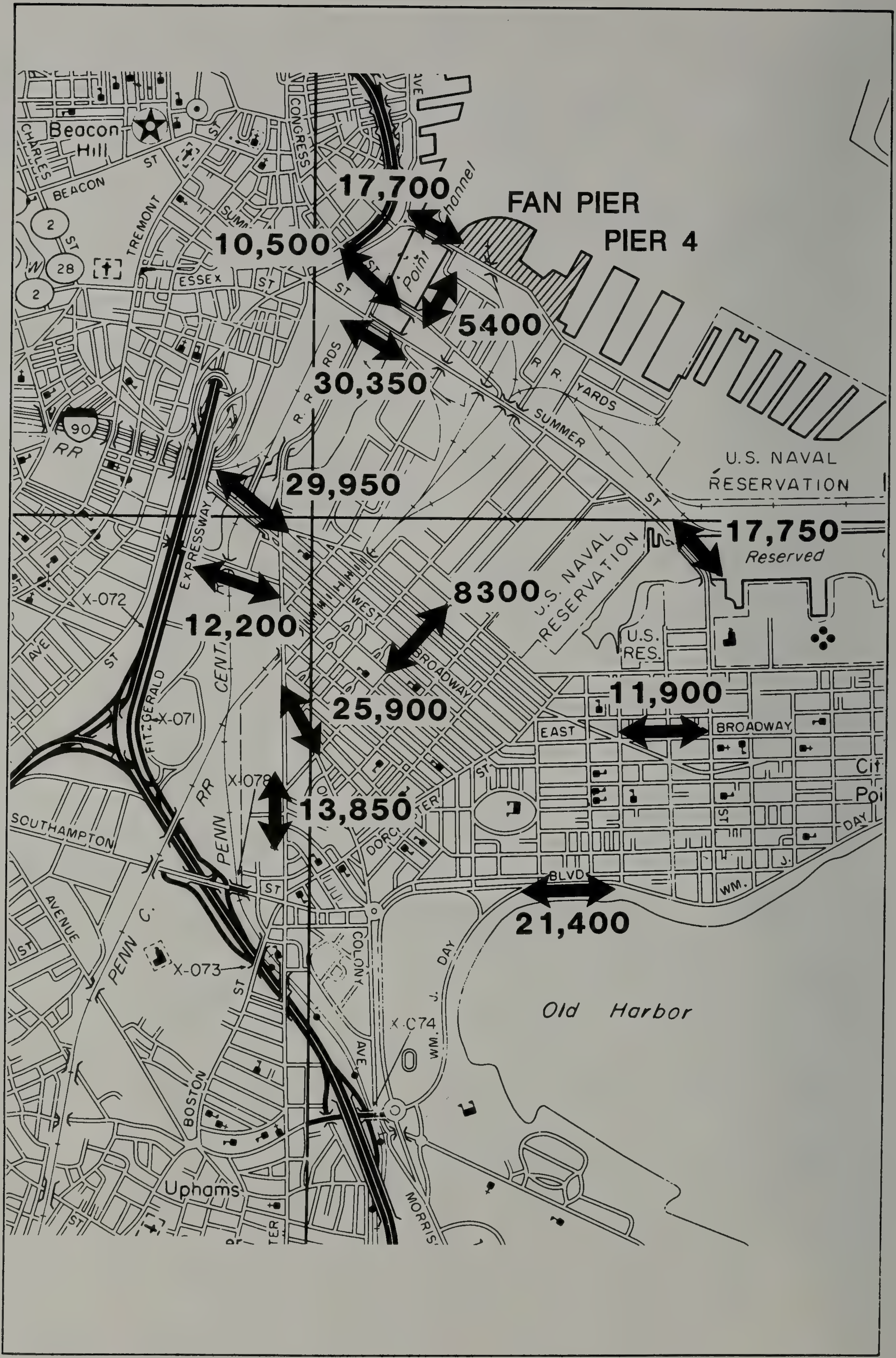


TABLE IV.1-3
Peak Hour
Directional
Distribution

Location	AM Peak Hour	PM Peak Hour
Northern Avenue at Atlantic Avenue	55% Eastbound	88% Westbound
Summer Street at D Street	62% Westbound	56% Eastbound
West Broadway at Dorchester Avenue	51% Westbound	53% Eastbound
Dorchester Avenue at Old Colony Avenue	68% Northbound	64% Southbound
W.J. Day Boulevard at L Street	78% Eastbound	69% Westbound
L Street at East Broadway	86% Northbound	74% Southbound

The peak hour directional distribution generally reflects travel toward downtown in the morning and travel away from downtown in the evening. A variation in this pattern is along Northern Avenue at Atlantic Avenue. Large commuter parking lots located on the Fan Pier and along Sleeper Street attract trips across the Fort Point Channel in the morning and generate trips in the opposite direction in the evening. A Central Artery northbound off-ramp on Atlantic Avenue south of Northern Avenue and an on-ramp north of Northern Avenue reinforce this pattern.

Existing Levels of Service

Figures IV.1-3 and IV.1-4 show 1985 peak hour turning movements at the analysis intersections in the study area. Turning movement counts shown for the AM and PM peak hour are an important element in determining roadway operating conditions as they enable the analyst to assess the vehicle conflicts expected at intersections. These traffic volumes were analyzed to determine existing conditions and form the base upon which future traffic conditions are projected. Levels of service at each study location were calculated and are presented in Table IV.1-4. The procedure and criteria used for determining levels of service are described in the Traffic Appendix. Three key terms used in the table to describe operating conditions are defined below:

Level of Service (LOS). Level of service is used to denote intersection operating conditions and is represented on a scale ranging from "A" at the highest level to "E" at the lowest level. Levels of Service "A" through "D" are generally considered acceptable while Levels "E"

FIGURE IV.1-3
Existing AM
Peak Hour
Volumes

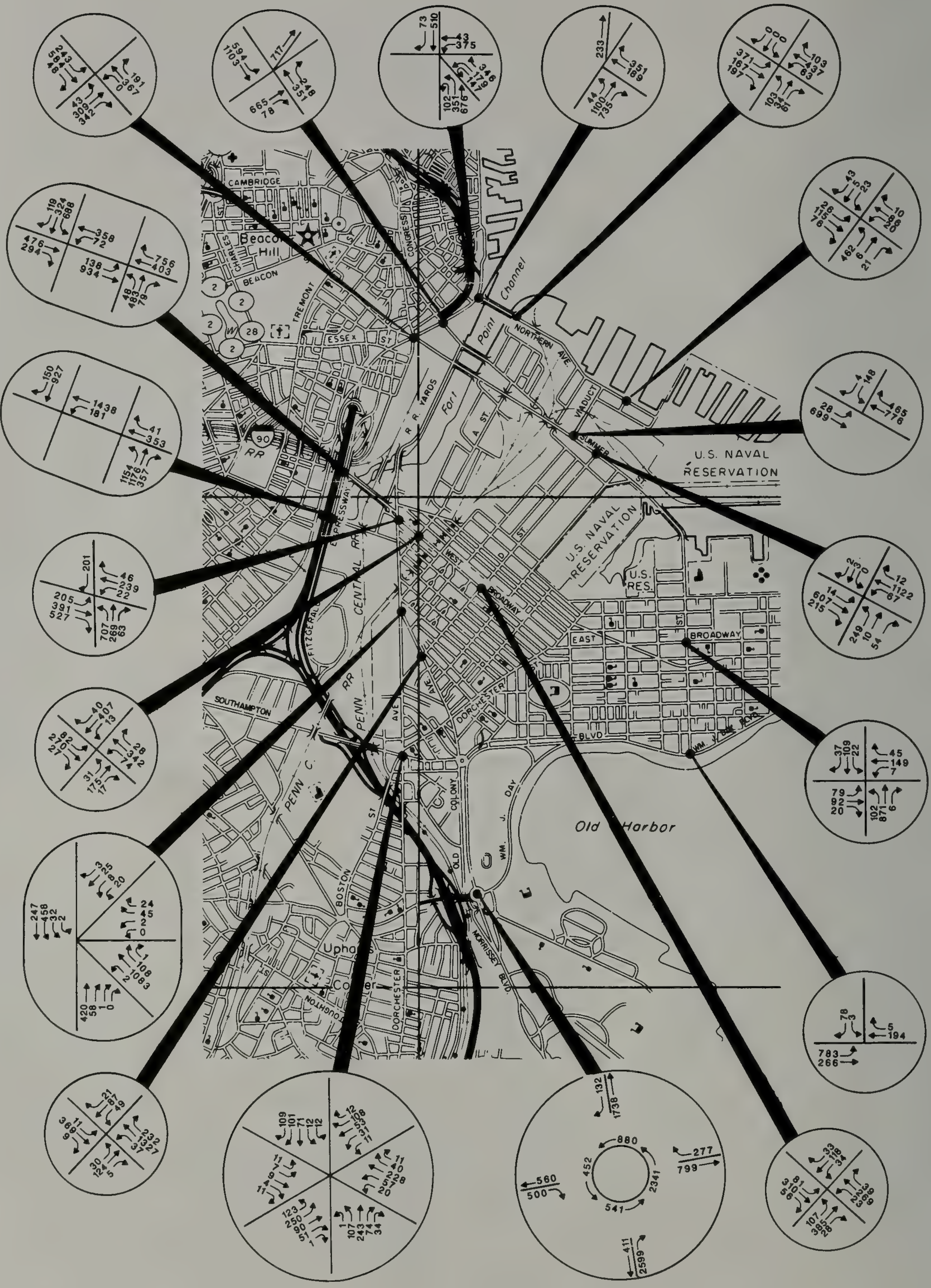
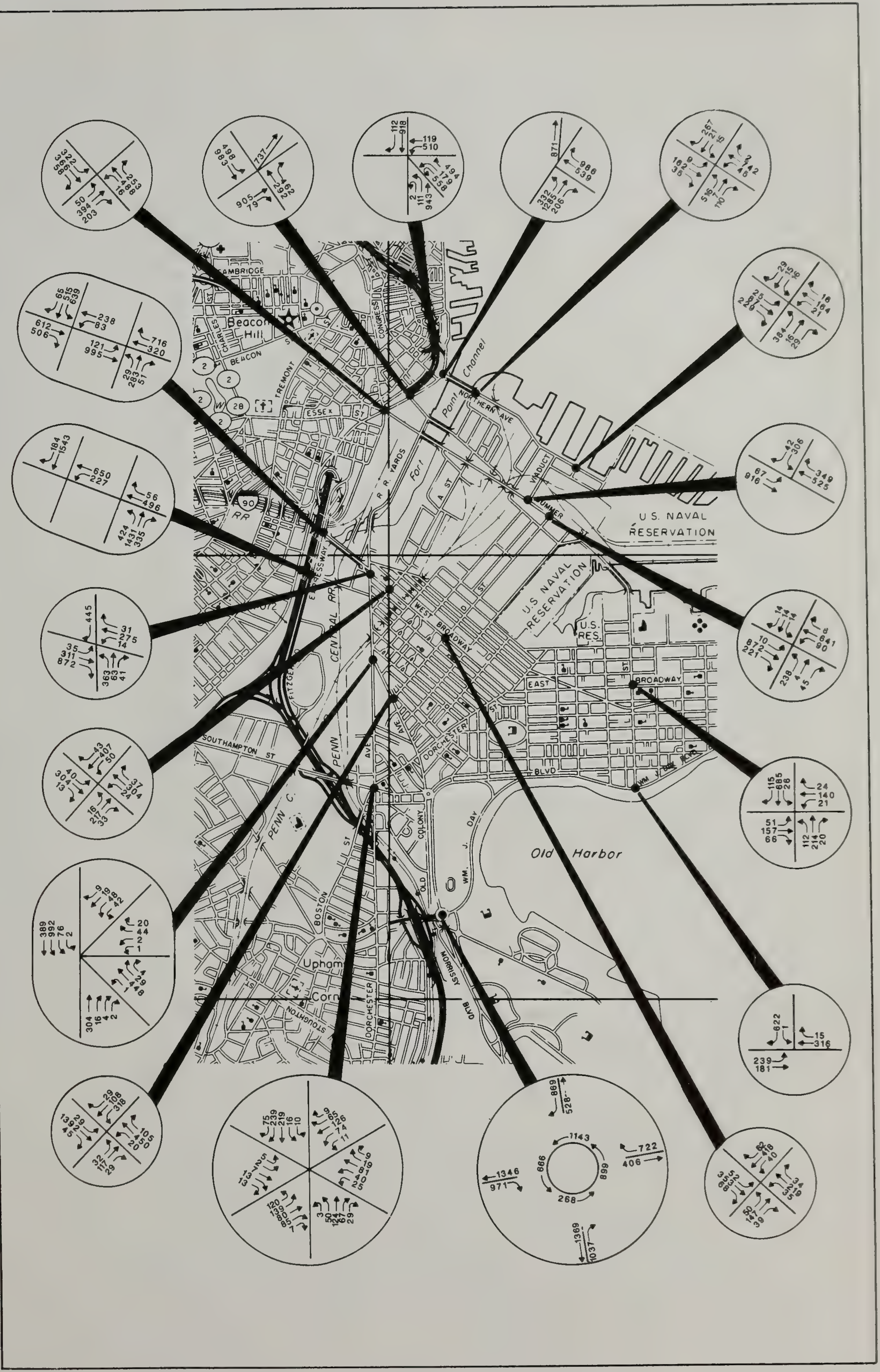


FIGURE IV.1-4
Existing PM
Peak Hour
Volumes



and "F" are not. At Level of Service "A" drivers experience little delay and intersections operate under free-flow conditions. Levels of Service "B" through "D" represent increasing amounts of delay and increasing numbers of vehicles which are stopped and may have to wait through more than one red signal. At Level of Service "E" the intersection is approaching capacity and processing the maximum number of vehicles possible. Long backups and queues of vehicles occur and many vehicles wait through more than one light cycle. Level of Service "F" results from volumes in excess of capacity and is characterized by jammed conditions. The increased volume results in forced-flow, stop and go traffic with intolerable congestion and delay.

Volume-to-Capacity Ratio (V/C). Volume-to-capacity ratio is a term that is used to quantify the level of service ranges. It compares the volume actually being processed through an intersection to the theoretical maximum capacity of the location. If the volume exactly matches the capacity, the V/C ratio is 1.00 which falls at the upper end of LOS "E". If the volume is less than capacity, the V/C ratio is less than 1.00. If the volume is greater than capacity, the V/C ratio is greater than 1.00. The latter condition occurs when more traffic wants to pass through a location than can be handled by it, thereby resulting in the congestion and delay associated with LOS "F". Each LOS range is denoted by a V/C ratio range with the lower ratios denoting the better levels of service. The specific ranges associated with each LOS are given in the Traffic Appendix.

Available Reserve Capacity (ARC). Available reserve capacity is a special term associated with unsignalized intersections. For these facilities, the major roadway is assumed to have the right-of-way and each individual movement on the side street (right, left, or through) is analyzed for its maximum capacity based on approach volumes on the major roadway. The actual volume being processed for each movement is compared to its calculated capacity. The difference between capacity and actual demand is defined as the available reserve capacity and is used as the criterion for determining level of service. Each LOS is associated with a range of ARC values, as shown in the Traffic Appendix. The higher the ARC, the better the LOS. The ARC and LOS values attached to an unsignalized intersection normally apply to the most critical movement at that location, i.e., the one with the least amount of reserve capacity.

In the morning peak hour, two locations are operating near or at capacity. One location is the intersection of Summer Street and Atlantic Avenue which is operating at Level of Service "E" with a volume-to-capacity ratio of

TABLE IV.1-4
Existing
Levels of
Service

Location	AM Peak Hour		PM Peak Hour	
	V/C*	LOS**	V/C	LOS
East Broadway/L Street	0.53	A	0.49	A
West Broadway/D Street	0.64	B	0.67	B
Old Colony Avenue/D Street	0.67	B	0.82	D
West Broadway/A Street	0.65	B	0.60	A
West Fourth Street/Frontage Road	0.74	C	0.68	B
East Berkeley Street/Albany Street	0.76	C	0.64	B
Herald Street/Albany Street	0.55	A	0.69	B
Summer Street/Viaduct	0.53	A	0.46	A
Summer Street/Atlantic Avenue	0.93	E	0.94	E
Northern Avenue/Atlantic Avenue***	0.61	B	0.91	E
Congress Street/Atlantic Avenue	0.83	D	0.88	D
Broadway Bridge/Frontage Road	0.75	C	0.60	A
Summer Street/D Street	0.66	B	0.62	B
Andrew Square	0.71	C	0.52	A
High Street/Atlantic Avenue	0.75	C	0.90	D
Old Colony Avenue/Dorchester Avenue	0.57	A	0.44	A
West Broadway/Dorchester Avenue	0.86	D	0.70	B
Northern Avenue/Ramp Street	149	D	143	D
Day Boulevard/L Street	352	B	251	C
Northern Avenue/Sleeper Street	242	C	0	E
Columbia Circle	1.03	F	1.05	F

* Volume-to-capacity ratio (available reserve capacity for unsignalized intersections).

** Level of service.

*** Analyzed as a signalized intersection (even though it is not) due to operating characteristics of this location during peak hour conditions.

0.93. The other location is the rotary at Columbia Circle which is operating at a volume-to-capacity ratio of 1.03 for the northbound traffic along Morrissey Boulevard which forms a queue waiting to enter the rotary.

In the evening peak hour, these intersections operate at similar levels of service as in the morning peak hour. In addition, two other intersections also operate at Level of Service "E". These are the intersection of Northern Avenue and Atlantic Avenue and the intersection of Northern Avenue and Sleeper Street. Both are currently unsignalized intersections. One other location, High Street at Atlantic Avenue, is at the borderline between Levels "D" and "E".

The level of service calculation for Northern Avenue and Sleeper Street represents conditions for side street traffic trying to cross or enter the Northern Avenue flow. However, the level of service calculation for Northern Avenue and Atlantic Avenue was done as if the intersection were signalized. This is because the stop-sign control on

Northern Avenue is ineffective during periods of heavy traffic. As a result, the conflicting flows of Northern Avenue traffic entering the northbound Central Artery ramp alternate crossing the intersection with Atlantic Avenue traffic. Queues form along both Atlantic Avenue and Northern Avenue. The signalized level of service analysis is the technique which produces results most closely representing the actual operating characteristics of the intersection.

Truck Traffic

Truck traffic using certain South Boston streets exists largely as a result of industrial uses located in the northern section. Table IV.1-5 shows truck traffic as a percent of approach traffic at several major intersections. Truck traffic tends to be heaviest in the morning peak hour. Several roadways with intersection approaches carrying more than 10 percent trucks in the morning including: Broadway, D Street, A Street, L Street, and Northern Avenue. In the evening, only D Street eastbound at Old Colony Avenue carries more than 10 percent trucks. Because of the negative impact of heavy truck volumes on intersection capacity, adjustments in level of service calculations were made for every intersection with any approach having more than five percent trucks.

Vehicle Speeds/Travel Times

Travel speeds provide a measure of performance that can be used to assess the effectiveness of streets to accommodate traffic volumes. Speed measurements were taken by a standard traffic engineering procedure called the "Floating Car Method." Travel speeds and delays along several key commuter routes in South Boston were measured by means of an observation car traveling in the traffic stream at a speed consistent with the flow of vehicles at any given time. Table IV.1-6 indicates the results, showing average speeds which were recorded in the peak direction on these roadways and which are representative of overall travel speeds. Spot speeds at specific points along the route may be higher or lower depending upon localized conditions.

The results of the corridor average travel speed study indicates the A Street, L Street and West Broadway corridors all experienced overall speeds less than 15 mph during peak periods. Average travel speeds lower than 15 mph were also observed on D Street during the afternoon peak period (3:30 PM to 6:00 PM). On the remaining streets, observed speeds were generally low, varying from 15 to 28 mph.

TABLE IV.1-5
Existing Truck Traffic Percentages at Selected Locations

Intersection and Approach	Percent Trucks	
	AM Peak Hour	PM Peak Hour
D Street/Summer Street		
D Street Eastbound	19	6
Summer Street Southbound	9	6
Summer Street Northbound	3	6
D Street/Old Colony Avenue		
Old Colony Northbound	2	5
Old Colony Southbound	4	3
D Street Eastbound	7	13
D Street Westbound	14	4
A Street/Broadway		
A Street Northbound	17	4
A Street Southbound	8	3
Broadway Eastbound	13	7
Broadway Westbound	13	4
Northern Ave./Atlantic Ave.		
Atlantic Avenue Northbound	6	4
Northern Avenue Westbound	18	N/A*
L Street/Broadway		
L Street Northbound	2	5
L Street Southbound	11	2
Broadway Eastbound	8	7
Broadway Westbound	6	5
D Street/Broadway		
D Street Northbound	2	3
D Street Southbound	8	3
Broadway Eastbound	6	4
Broadway Westbound	5	9

* Trucks not counted because of high volumes and lack of traffic control.

TABLE IV.1-6
Travel Speeds in
Peak Direction

Roadway	AM Peak Hour (mph)*	PM Peak Hour (mph)
Summer Street	27	25
L Street	14	19
Congress Street	14	24
D Street	26	10
Northern Avenue	26	21**
West Broadway	12	14
A Street	13	6
Sleeper Street	17	17
Old Colony Avenue	28	11

* Average speed in the peak travel direction in miles per hour.

** Does not include delay at approach to Atlantic Avenue.

Source: Field inventory for the Commonwealth Pier EIR, 1981. Traffic counts taken in 1981 and 1985 indicate little change in volumes and establish the validity of using the earlier data to represent existing conditions.

In addition to observing travel speeds, average travel times were recorded over selected alternative routes between the Fan Pier and Pier 4 sites and the Massachusetts Turnpike Extension and the Southeast Expressway. Average times and distances for five inbound routes from the south, for six outbound routes to the south, and for three outbound routes to the west were recorded and are reported in Table 10 of the Traffic Appendix. The routes studied include the major commuter routes through South Boston along L, D, and A Streets, and routes across the Fort Point Channel on Northern Avenue and Congress Street. These average travel times were considered in the assignment of future trips to the study area street system.

Planned Roadway Improvements

Several changes to the area's roadway system are expected to be constructed during the 1995 time frame of the analysis which will affect travel to/from the project site. Those that will be implemented prior to 1995 are included in all No-Build and Build analyses. These include:

- New Northern Avenue Bridge and Relocated Northern Avenue -- The existing Northern Avenue Bridge over the Fort Point Channel will be replaced with a new four-lane structure to the south and a new Northern Avenue will be built between B Street and the new span. Existing Northern Avenue will be improved and will remain on its present alignment east of Sleeper Street. Connections between old and new Northern Avenue are planned at Sleeper Street, Pittsburgh Street and two other locations to the east.

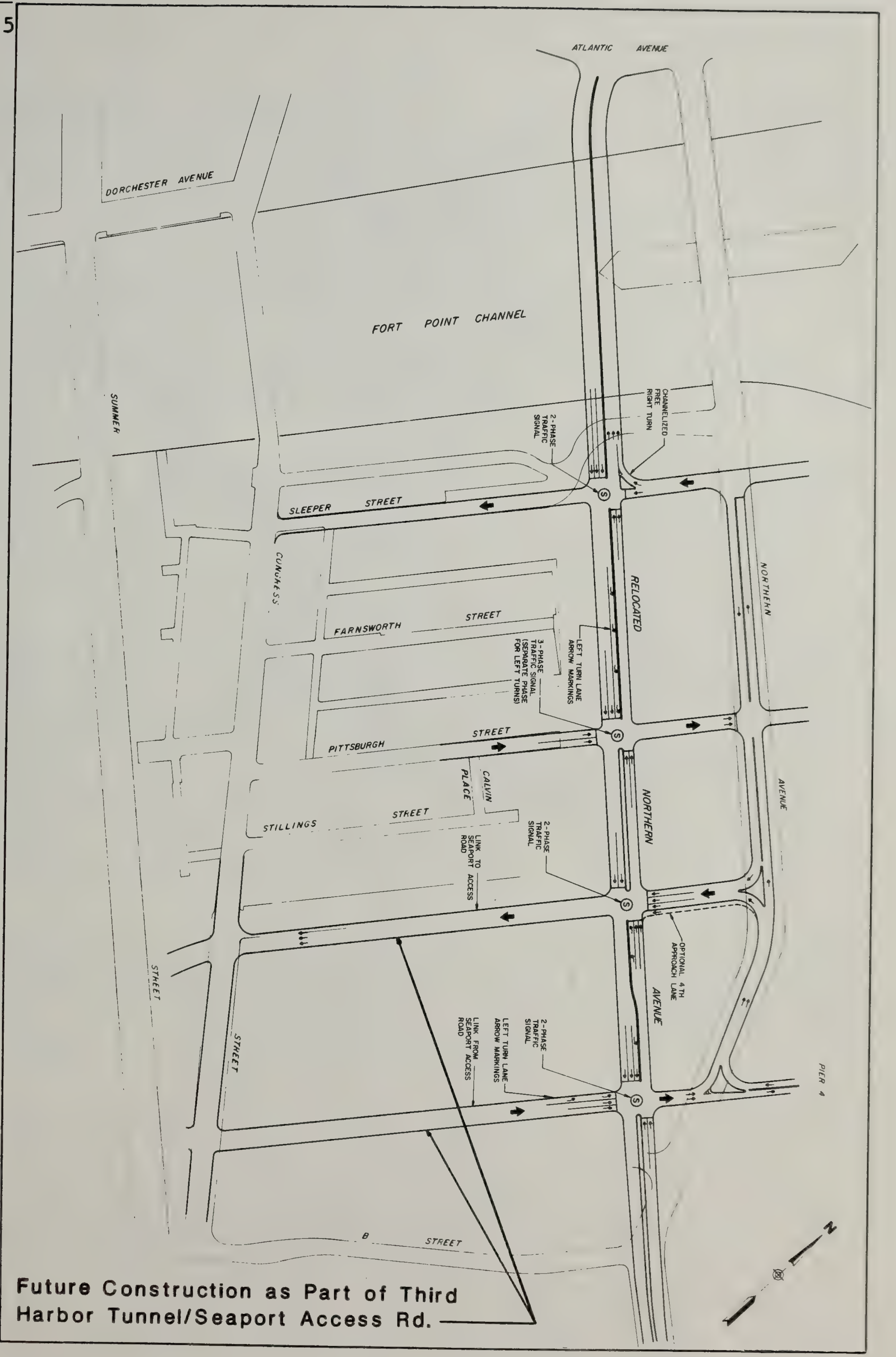
  When extended as part of the Seaport Access Road construction project, these eastern links will provide access/egress to the Third Harbor Tunnel and Central Artery. These connections will operate in an alternating one-way pattern. Figure IV.1-5 shows the proposed concept plan with the future Seaport Access Road connections in place south of Relocated Northern Avenue. It should be noted these connections will not be provided prior to completion of the Seaport Access Road. The new bridge and Relocated Northern Avenue are in final design. Construction is expected to commence in early 1987 and should take one and one-half years to complete. The Massachusetts Department of Public Works (MDPW) and the City of Boston are jointly responsible for this project.

- Relocated High Street Off-Ramp -- As part of the International Place project now under construction on the former site of the City's Fort Hill Garage, plans have been developed to relocate the existing High Street off-ramp from the Central Artery southbound to direct traffic to Purchase Street. The Massachusetts Department of Public Works and City of Boston are jointly involved in the planning of this improvement.

- North Area/Central Artery Project -- The existing Central Artery Bridge over the Charles River and its connections to I-93, Route 1 and the Tobin Bridge will be reconstructed to relieve a severe safety problem and capacity bottleneck. A multi-level, fully-directional interchange will be provided. The Massachusetts Departments of Public Works indicates that construction is scheduled to begin in mid-1987 and should take three years to complete.

- Day Boulevard Improvements -- The Metropolitan District Commission (MDC), which has jurisdiction over Day Boulevard, has plans to install traffic signals at several locations along the Boulevard. Only one of these signals will be located west of L Street (at Columbus Park) along the section of roadway used by daily commuters.

FIGURE IV.1-5
Relocated (New) Northern Avenue With Future Links To Seaport Access Road


ATLANTIC AVENUE
DORCHESTER AVENUE
FORT POINT CHANNEL
SUMMER STREET
CONGRESS STREET
SLEEPER STREET
FARNSWORTH STREET
PITTSBURGH STREET
CALVIN PLACE
STILLINGS STREET
B STREET
RELOCATED NORTHERN AVENUE
NORTHERN AVENUE
PIER 4
N
2-PHASE TRAFFIC SIGNAL
CHANNELIZED FREE RIGHT TURN
LEFT TURN LANE ARROW MARKINGS
3-PHASE TRAFFIC SIGNAL (SEPARATE PHASE FOR LEFT TURNS)
2-PHASE TRAFFIC SIGNAL
LINK TO SEAPORT ACCESS ROAD
OPTIONAL 4TH APPROACH LANE
2-PHASE TRAFFIC SIGNAL
LEFT TURN LANE ARROW MARKINGS
LINK FROM SEAPORT ACCESS ROAD
S
Future Construction as Part of Third Harbor Tunnel/Seaport Access Rd.

In addition to the above, a major proposed project involves the reconstruction and depression of the Central Artery through downtown Boston, construction of a new Third Harbor Tunnel under Boston Harbor to Logan Airport and beyond to the regional highway system, and a connecting link called the Seaport Access Road through South Boston between the Central Artery/Southeast Expressway/Massachusetts Turnpike and the new tunnel, with local access to/from South Boston. Figure IV.1-6 shows the future South Boston street network with the proposed Seaport Access Road and Third Harbor Tunnel. The project has undergone environmental review and a refined alignment (Alternative 5A - Modified) is under design. Because of uncertainties in Federal funding for the entire project, the transportation analysis of Fan Pier and Pier 4 has been conducted both with and without the Central Artery/ Third Harbor Tunnel project.

■ Public Transportation System

The sites of the proposed projects are accessible to several parts of the public transportation system. Figure IV.1-7 shows the existing facilities and services in the area. These include Red Line and Blue Line rapid transit, commuter rail, local and commuter bus, and commuter boat.

Rapid Transit

Pedestrian access to rapid rail transit lines from the proposed project will involve walking distances greater than one-half mile as shown in Table IV.1-7. A Red Line station is located at South Station while the Blue Line Aquarium Station is located at State Street and Atlantic Avenue (at the Marriott Long Wharf). Currently, walking distances between the sites and both stations are approximately equal. However, with the relocation of the Northern Avenue bridge, walking distance to the Aquarium Station will be increased by approximately 500 feet.

TABLE IV.1-7
Walking Distances Between the Sites and Rapid Transit Stations

	Walking Distance (feet)	
Site Location	South Station	Aquarium*
Sleeper Street/ Old Northern Avenue	2,400	2,950
Pittsburgh Street/ Old Northern Avenue	3,100	3,650
Pier 4 Entrance/ Old Northern Avenue	4,100	4,650

* Distances to the Aquarium Station are via the relocated Northern Avenue bridge and are approximately 500 feet longer than via the existing bridge.

FIGURE IV.1-6
Future
Network With
Third Harbor
Tunnel

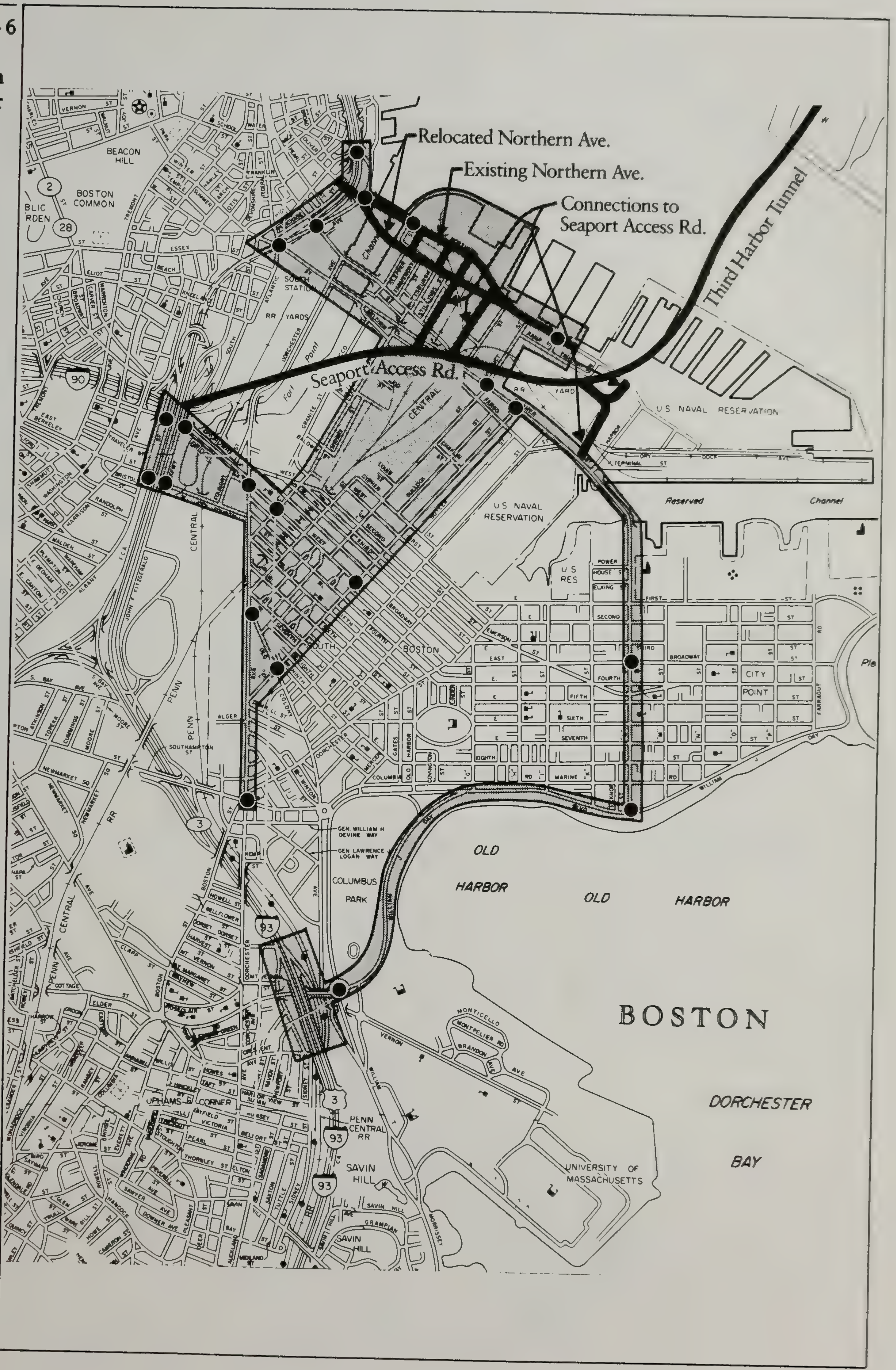
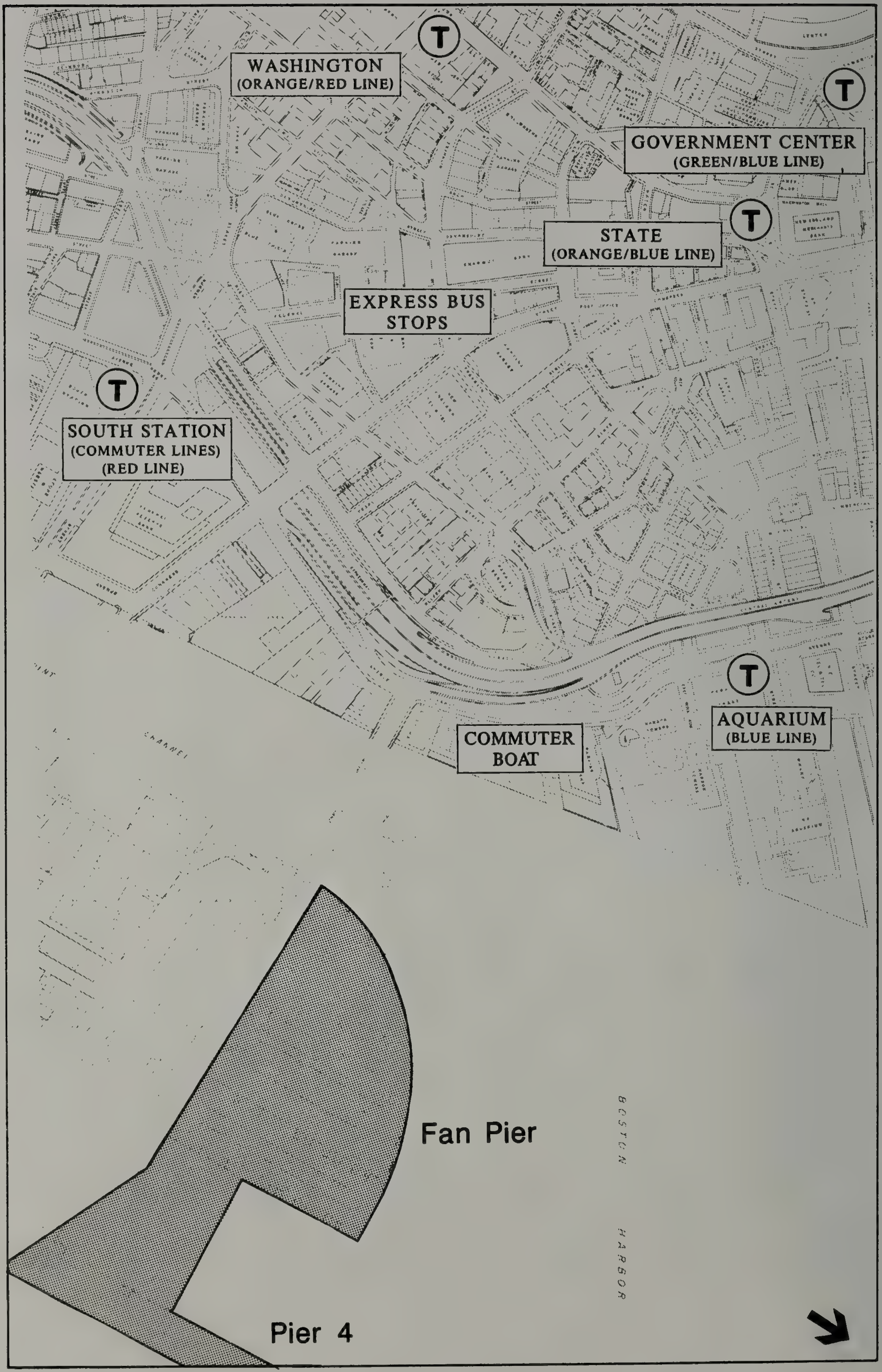


FIGURE IV.1-7
Public Transportation Facilities



The Red Line runs from Alewife in Cambridge on the north through downtown Boston to Andrew Station in South Boston. South of Andrew, the route divides with one branch terminating at Ashmont in Dorchester and the other going to Quincy and Braintree. Major commuter parking garages are provided at Alewife, Quincy Center, Quincy Adams (junction of Routes 3 and 128) and Braintree, while smaller parking lots are provided at North Quincy and Wollaston. Transfer points on the Red Line occur at the two stations north of South Station. Washington is the transfer point to the Orange Line and Park Street is the transfer point to the Green Line.

The Blue Line runs from Wonderland in Revere on the north to Bowdoin just west of Government Center. Transfer points are at the two stops west of Aquarium. Orange Line transfers are made at State Street and Green Line transfers are made at Government Center.

The capacity of the Red Line at South Station is considerably higher than the Blue Line at Aquarium Station as shown in Table IV.1-8. At South Station, the Red Line can accommodate almost 18,000 passengers under "normal"

TABLE IV.1-8
Existing Peak Hour Rapid Transit Capacities and Ridership

				Capacity* Per Car		Line Capacity		
Line/Segment	Cars/ Train	Headway (Minutes)	Number of Trains	Normal	Crush	Normal	Crush	Ridership***
Red Line								
Alewife-Ashmont	4	8.5	8	187	244	5,984	7,808	
Braintree-Davis	4	8.5	8	187	244	5,984	7,808	
Quincy-Park	4	8.5	8	187	244	5,984	7,808	
Total (through South Station)	4	2.8	24	187	244	17,952	23,424	12,120
Blue Line								
Bowdoin-Wonderland	4	4	16	110	139	7,040	8,896	6,120

* Normal capacity includes seating capacity plus standees at 2.5 square feet of space per person. Crush capacity is based on 1.75 square feet per standee.

** Line capacities assume consistent operation at the stated headways. Equipment breakdowns and malfunctions which cause delays will reduce the effective capacity of the line.

*** Based on 1984 MBTA counts of in-vehicle passengers in peak direction at peak load point stations (Andrew on the Red Line and Aquarium on the Blue Line).

loadings and over 23,000 passengers under "crush" loadings during the peak hour in the peak direction. The Blue Line can accommodate approximately 7,000 and 8,900 peak hour peak direction passengers, respectively, under "normal" and "crush" loadings. The greater Red Line capacity at South Station is due to the use of higher capacity cars at greater frequencies. Current MBTA schedules call for trains passing through South Station every two and one-half to three minutes while trains on the Blue Line are approximately four minutes apart.

The MBTA periodically counts in-vehicle passengers at certain peak load point stations. On the Red Line, the peak load points are Andrew and Charles. On the Blue Line, Aquarium is the peak load point. Based on peak hour counts of passengers in the peak direction and assuming MBTA schedules are met, both the Red Line and the Blue Line are operating within their "normal" as well as "crush" capacities.

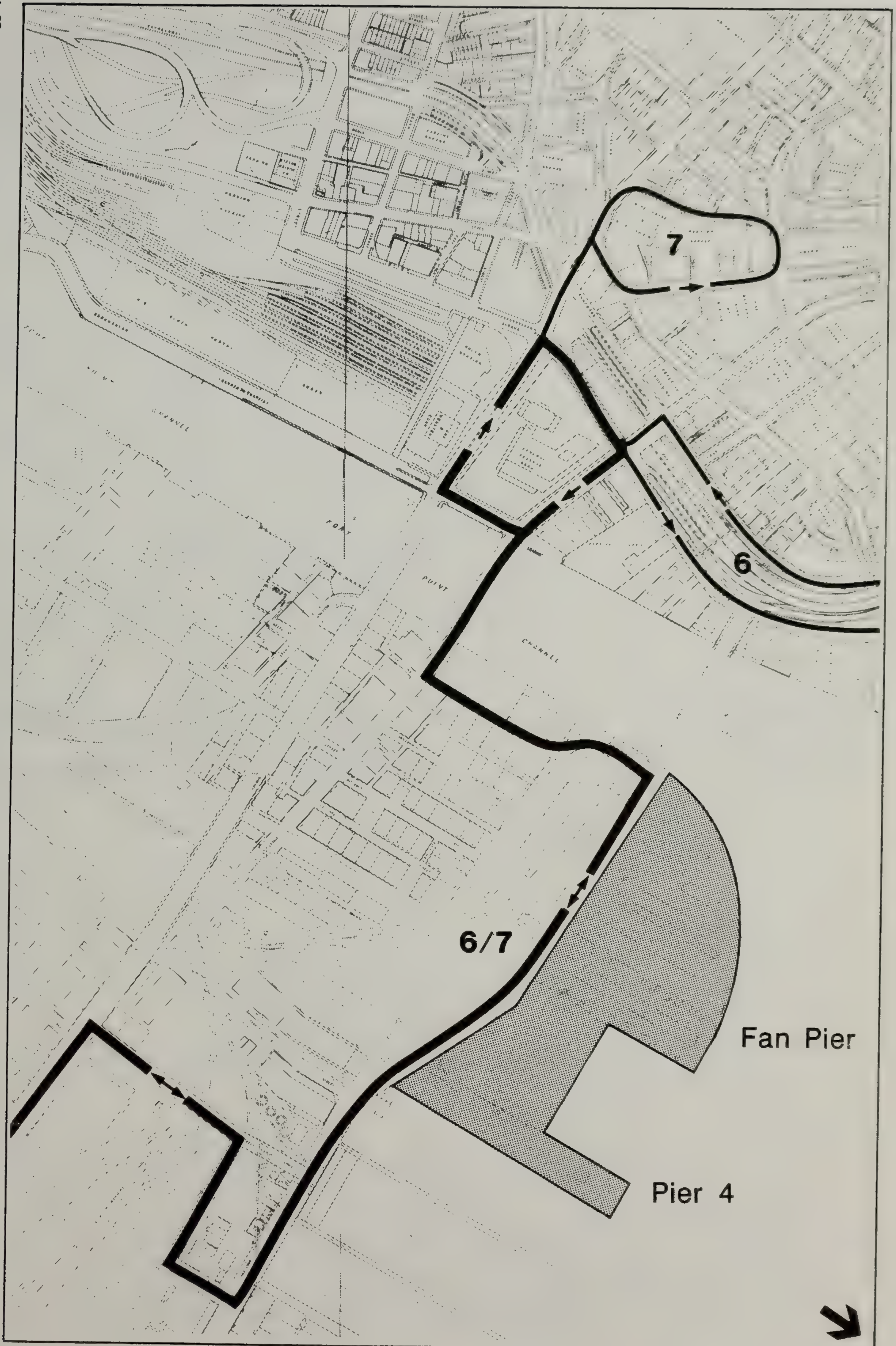
It should be noted that peak hour ridership does not generally occur uniformly over the peak hour. Instead, there may be surges over short periods of time. In such cases, the number of passengers waiting on the platform may exceed the available space on arriving trains. As a result, some passengers will be forced to wait for two or more trains. However, based on the ridership and capacity figures available, such conditions do not persist throughout the peak hour.

Another factor which affects the capacity of the system is equipment reliability. The Red Line has suffered from equipment malfunctions over the past several years. Such malfunctions disrupt the schedule of service and reduce system throughput. The result is a lower effective capacity than would be available under operations not suffering such disruptions. The planned improvements to the Red Line described later in this section should increase system reliability dramatically. The net effect should be more consistent achievement of the system capacities shown in Table IV.1-8.

Local Bus Service

The MBTA currently operates two bus routes which directly serve the proposed project sites. These are Route 6, Army Base-Haymarket and South Station (via Northern Avenue), and Route 7, City Point-downtown (via Northern Avenue). Figure IV.1-8 shows these routes within the study area. Both routes provide service between the project sites and South Station where there are connections to the Red Line, Commuter Rail and private commuter buses. Route 6 also stops at the Aquarium Blue Line Station and Haymarket Station with connections to the Orange and Green Lines and North Shore express buses.

FIGURE IV.1-8
Local MBTA Bus Routes 6 and 7 in Vicinity of Projects



Route 6 operates only during weekday peak periods, with buses scheduled at 15-minute intervals. Service between South Station and Haymarket Station is provided only at half-hour intervals. Route 7 operates on weekdays between the hours of 5:15 AM and 10:15 PM. During peak hours, scheduled headways average 12 minutes in the morning and 14 minutes during the afternoon. Based on the published schedules for Routes 6 and 7, a total of 11 buses per direction serve the site along Northern Avenue during the morning peak hour, while nine serve the sites during the evening peak hour.

The typical bus used on Routes 6 and 7 has a seating capacity of 46 passengers. Its total carrying capacity is estimated at 76 passengers, although greater loads can be accommodated under crush conditions. Based on the scheduled headways and bus design capacities, a total of 506 to 836 passengers can be accommodated in each direction in the morning peak hour, while between 414 and 684 can be handled in the evening.

Ridership information for early 1985 was provided by the MBTA for Routes 6 and 7. These data are summarized in Table IV.1-9 which shows peak passenger bus loads. The peak passenger load point information was collected at the intersection of Congress Street and Dorchester Avenue.

TABLE IV.1-9
Local Bus Ridership*

Direction/ Time Period	Route 6 Average Buses	Route 6 Average Passengers	Route 7 Average Buses	Route 7 Average Passengers	Total Average Buses	Total Average Passengers
Outbound from South Station						
5:00-6:00 AM	1	10	-	-	1	10
6:00-7:00 AM	4	36	2	28	6	33
7:00-8:00 AM	4	49	5	41	9	45
8:00-9:00 AM	4	30	5	22	9	26
Inbound to South Station						
3:00-4:00 PM	4	41	4	33	8	37
4:00-5:00 PM	4	27	4	27	8	27
5:00-6:00 PM	4	21	4	9	8	15

* Peak Passenger Loadings at Congress Street and Dorchester Avenue.

NOTE: Typical bus seating capacity is 46 passengers. Total design capacity is 76 passengers.

SOURCE: Massachusetts Bay Transportation Authority passenger counts for February 26, May 1, and May 17, 1985.

The busiest hour of the day for both routes is 7:00-8:00 AM when Route 6 operates at 107 percent of seating capacity and Route 7 operates at almost 100 percent of seating capacity in the outbound direction toward the Army Base. Between 4:00 and 5:00 PM, the inbound direction for both routes operates at only 60 percent of seating capacity. The peak loading in the evening occurs between 3:00 and 4:00 PM when almost 90 percent of the Route 6 seating capacity and 80 percent of the Route 7 seating capacity is utilized.

Commuter Express Bus Service

Five MBTA commuter express bus routes operate from the downtown Financial District to suburban communities west of Boston. The buses operate along the Massachusetts Turnpike and stop at the corner of Franklin and Federal Streets. This location is approximately 3,600 feet walking distance from the proposed Fan Pier offices and 4,600 feet from Pier 4. As shown in Table IV.1-10, 48 buses are scheduled to arrive downtown between 7:30 and 8:30 AM. In the evening, 45 buses are scheduled to depart between 4:30 and 5:30 PM. Based on a seating capacity of 45 per bus, the morning inbound capacity of the commuter buses is 2,160 and the evening outbound capacity is 2,025.

TABLE IV.1-10
Commuter Bus Service to Financial District

Route Number	Name	Number of Buses* AM Peak	PM Peak
300	Riverside	10	10
301	Brighton Center	13	11
304	Watertown via Newton Corner	7	7
305	Central Square Waltham	7	7
310**	Needham	11	10
Total		48	45

* Arrivals between 7:30 and 8:30 AM and departures between 4:30 and 5:30 PM.

** Arrivals and departures at Franklin and Devonshire Streets. This bus is to be phased out with the re-instatement of commuter rail service to Needham.

Commuter Rail

The MBTA's commuter rail system operates out of terminals located at North Station and South Station. The system is comprised of eight branches, four of which terminate at South Station (Framingham, Franklin, Shore and Stoughton). The South Station terminal is within walking distance of the proposed project sites or can be reached via the

Routes 6 and 7 buses. North Station can be reached via the Red Line with transfer to the Orange or Green Line or via the Route 6 bus to Haymarket with a transfer to the Orange or Green Line. Table IV.1-11 summarizes the capacity and ridership of the commuter rail service.

TABLE IV.1-11
Summary of Existing Commuter Rail Service

Branch	Number of Trains		Peak Period Seating Capacity*		Peak Period Ridership**	
	AM	PM	AM	PM	AM	PM
Framingham	4	4	2,300	1,700	2,210	1,815
Franklin	5	4	2,800	2,400	3,000	2,505
Shore	5	5	2,800	3,300	2,935	2,640
Stoughton	4	3	2,200	1,500	2,070	1,170
Eastern	6	6	2,300	2,300	2,530	2,140
Reading	6	5	2,400	2,000	1,825	1,440
New Hampshire	6	6	1,700	1,600	1,100	1,140
Gardner/ Fitchburg	4	4	1,300	1,200	1,230	1,045

* Seating capacity is based on 100 seats per car.
** Represents winter 1984 data.

SOURCE: MBTA Commuter Rail Section.

As can be seen from the table, overall peak period ridership on the commuter rail system generally does not exceed the seating capacity. However, there are instances where standees exist on various train trips. When the number of standees on a particular train regularly approximates 50, consideration is given to adding a car, as feasible.

Commuter Boat

An increasingly important part of the public transportation system serving downtown Boston is the commuter boat service. Although carrying fewer passengers than other forms of transportation, there has been increased emphasis on improving the service and building ridership.

Commuter boat service to downtown is provided from Hull (50 minutes), Hingham (30 minutes), and Quincy (25 minutes). A total of 11 boat trips operate during morning and evening peak commuter periods and can accommodate almost 1,600 passengers. All vessels have full weather protection. Hingham and Quincy trips dock at Rowes Wharf; the Hull boat docks at Long Wharf. Recent reconstruction of the Southeast Expressway has prompted some of the added service which, in turn, has generated continuously increasing ridership levels. Specific capacity and ridership information is provided in Table IV.1-12.

TABLE IV.1-12
Peak Period*
Commuter Boat
Service

From	To	Trips	Capacity	Ridership
Hingham	Rowes Wharf	8	1,019	575
Hull	Long Wharf	1	300	100-200**
Quincy	Rowes Wharf	2	278	50-65
		11	1,597	725-840

---

* 6:00 AM - 9:30 AM and 3:15 PM - 7:30 PM.

** Highly seasonal

The commuter boat dock at Rowes Wharf is located within walking distance of the Fan Pier and Pier 4 projects and, with the exception of local bus service, is the closest of all the public transportation facilities serving the sites. An improved docking facility will be incorporated within the Rowes Wharf Development which is currently under construction. With the increased emphasis being placed on this mode at the state level, there is potential for a significant increase in usage.

Planned Public Transportation Improvements

The most significant public transportation improvements planned which will affect service to the proposed projects are the development of the Transportation Center at South Station and the upgrading of the Red Line rapid transit service. The rehabilitation and expansion of South Station which is currently underway will result in a centralized location for many transportation services. Included will be Amtrak; MBTA Commuter Rail; private commuter and long haul bus service; direct connections within the Station area to the Red Line; parking for 500 cars initially with planned expansion to 2,000 spaces; and direct ramp connections to the South Bay interchange serving the Southeast Expressway, the Massachusetts Turnpike Extension, the Central Artery and, ultimately, the Seaport Access Road and Third Harbor Tunnel. The result will be a major intermodal transportation center located within walking distance of the sites and connected to them by two local MBTA bus routes (Routes 6 and 7).

The MBTA is undertaking a major program of improvements to the Red Line. These improvements include the following:

o Station Modernization -- Ten Red Line stations, including South Station, will be modernized under a program scheduled for completion in 1987. As part of the station modernization program, the platforms at several stations will be lengthened to accommodate six-car trains instead of the current maximum of four cars. As a result, a 50 percent increase in the capacity of the Red Line is possible if current schedules are maintained.

- Acquisition of New Cars -- Beginning in mid-1986 the MBTA will take delivery of 58 new cars for use on the Red Line. Delivery should be complete by mid-1987.

- Renovation of Existing Cars -- The MBTA has contracted for the renovation of all 76 Silverbird cars in the current Red Line fleet. Renovation should be completed and all cars returned to service by 1987. The 88-car Bluebird fleet was recently rebuilt so that by 1987 the entire fleet will be newly renovated (with a life expectancy of 15 years) or newly acquired.

- Track Reconstruction -- In May 1985, a construction project to replace the entire track structure from Harvard Station to Charles Street was begun. This project should be complete in 1987, when the next phase of reconstruction between Charles Street and Andrew station will begin, provided federal funds are available.

The programmed improvements to the Red Line should be completed well in advance of the 1990 and 1995 Build years for the Fan Pier and Pier 4 projects. As a result of these improvements, the Red Line will have increased capacity, greater reliability, and improved comfort and convenience.

■ Existing Parking

The Fan Pier site currently serves as a surface parking lot used by daily commuters working in downtown Boston. This lot has proved to be attractive to downtown workers because, at $3.00 per day, it is considerably less expensive than downtown parking. It is estimated that the practical capacity of the lot is approximately 2,000 vehicles. In June and July of 1985 daily usage averaged approximately 1,125 vehicles. This is down approximately 25 percent from a daily average of 1,470 in June and July of 1984 when the fee was only $2.00 per day. Peak hour counts taken in June 1985 indicate that almost 510 vehicles entered the lot in the morning peak hour. In the evening peak hour, almost 440 vehicles exited from the lot.

Table IV.1-13 shows the directional distribution of the peak hour entering and exiting vehicles. The majority of the commuters access the surface lot from Atlantic Avenue.

TABLE IV.1-13
Directional Distribution of Fan Pier Parkers

Location	AM Entering Vehicles Percent From	PM Exiting Vehicles Percent To
Atlantic Avenue-West	73	70
Sleeper Street-South	7	5
Ramp Street-East	20	25

In addition to using the Fan Pier lot, daily commuters also park on the "Cabot, Cabot & Forbes" parcel on the south side of Northern Avenue. On-street parking is available along Northern Avenue and is used extensively by tour buses, especially those associated with the Children's Museum. Finally, about 650 spaces are located on Pier 4. These spaces are restricted to use by patrons of Anthony's Pier 4 Restaurant.

PROBABLE PROJECT IMPACTS

In order to assess the probable impacts of the proposed Fan Pier and Pier 4 developments on the area's transportation system, it is necessary to project travel demands from the proposed projects as well as from other likely 1990 and 1995 developments in the area. The new demands must be added to existing base conditions in order to derive a projection of future conditions.

■ Travel Demands

Vehicle-Trip Generation

To assess the impact of the proposed Fan Pier and Pier 4 developments, separate travel demand estimates by land use and type of trip (work and non-work) were made. This approach entailed the use of daily person-trip generation rates for office, retail and hotel uses for both trip types. Mode split factors, peak hour factors and vehicle occupancy rates were then applied to the daily person-trip rates to obtain the peak hour vehicle-trip generation rates shown in Table IV.1-14. Also shown in the Table are the daily and peak hour generation rates for housing, which were derived directly in terms of vehicle-trips rather than person-trips. The housing rates are based on a survey of Harbor Towers, a downtown waterfront residential development. The assumptions for office, retail and hotel were developed from multiple sources, including the Boston CBD Parking Study; recent EIR's prepared for major projects in downtown Boston; 1980 Journey-to-Work Census data for South Boston; and surveys of the Marriott Long Wharf Hotel and the Holiday Inn on Cambridge Street in Boston. The Traffic Appendix provides a detailed listing and explanation of the trip generation assumptions used to project Fan Pier and Pier 4 traffic. It should be noted that these assumptions provide an estimate of demand that is not constrained by the availability of parking or adverse traffic conditions.

TABLE IV.1-14
Project Vehicle-trip Generation Rates

	Office* Trips/KSF**		Retail Trips/ KSF**	Hotel Trips/ Room	Residential Trips/Unit
	Fan Pier	Pier 4			
Daily					
In	2.68	2.92	4.04	2.59	1.54
Out	2.68	2.92	4.04	2.59	1.54
Total	5.36	5.84	8.08	5.18	3.08
AM Peak Hour					
In	0.98	1.12	0.09	0.18	0.08
Out	0.03	0.03	0.01	0.19	0.15
Total	1.01	1.15	0.10	0.37	0.23
PM Peak Hour					
In	0.06	0.06	0.23	0.29	0.15
Out	0.98	1.12	0.46	0.23	0.15
Total	1.04	1.18	0.69	0.52	0.30

* Office rates are based on 35 percent transit for Fan Pier work trips and 25 percent transit for Pier 4 work trips reflecting the increased walking distance to Pier 4 from major transit terminals.

** Thousand square feet.

The proposed project is a mixed-use development consisting of office, retail, hotel, and residential uses. The proposed development program was shown earlier in Table IV.1-1. The vehicle-trip generation rates described above were applied to these program elements to calculate vehicle-trip generation which is shown in Table IV.1-15.

The proposed developments would generate approximately 12,000 vehicle-trips daily at Initial Build and 24,000 trips daily at Full Build if there were no restrictions on travel demand because of limited parking availability or unfavorable traffic conditions. In 1990 the Initial Build morning peak hour volume is expected to be 1,330, or 11.1 percent of the daily total. The evening peak hour volumes are projected to be approximately 1,590, or 13.3 percent of the daily total. At Full Build the morning peak hour volume is projected to be 2,930 trips or 12.1 percent of the total, while the evening volume would be approximately 3,460 or 14.3 percent of the daily total.

TABLE IV.1-15
Vehicle-trip
Generation

Time	1990 Initial Build Fan Pier	 Pier 4	 Total	1995 Full Build Fan Pier	 Pier 4	 Total
Daily						
In	4,214	1,760	5,974	8,115	3,962	12,077
Out	4,214	1,760	5,974	8,115	3,962	12,077
Total	8,428	3,520	11,948	16,230	7,924	24,154
AM Peak Hour						
In	717	313	1,030	1,694	770	2,464
Out	222	78	300	323	143	466
Total	939	391	1,330	2,017	913	2,930
PM Peak Hour						
In	328	121	449	495	228	723
Out	783	356	1,139	1,844	890	2,734
Total	1,111	477	1,588	2,339	1,118	3,457

NOTE: Trip volumes include delivery vehicles and taxis as well as private automobiles.

In the morning peak hour, approximately 84 percent of the trips are expected to be inbound while in the evening, approximately 79 percent of the trips will be outbound.

The impacts of these vehicular demands on the existing street system are shown in Traffic Appendix. As discussed in the following section of the report, the volumes were developed without regard for parking supply at the sites and represents a worst case analysis that is not realistic. Thus, subsequent analysis is based upon the parking constrained demand.

Parking Constrained Demand

As described in the previous section, the initial projections of project travel demand were unconstrained by any consideration of parking availability. However, as part of this study the parking demands created by the Fan Pier and Pier 4 projects were compared to the proposed parking supply (see Parking Impacts section). The result was a projected deficit of 725 parking spaces for the Initial Build and over 2,100 spaces for the Full Build. Such shortages of parking would substantially curtail the number of vehicle-trips that could realistically be made to the site.

Travelers who would have opted to drive to the site will, therefore, be forced into seeking alternative modes of travel. This is particularly true given that public parking available in off-site areas is projected to be negligible. Previous EIR's in the areas as well as the

Boston CBD parking study have documented future year parking demands exceeding available supply. Given the new parking demands created by future development projects and the lack of any known public proposal to create parking supply, it is likely that parking shortages will exist throughout the area.

The subsequent analysis steps have been based upon travel to the site being constrained by the proposed parking supply. Travel which was diverted due to lack of parking was added to the regional transit system, creating a worst case transit demand situation. This is discussed in the Public Transportation section of the report. The projected parking constrained travel demands are shown in Table IV.1-16. A more detailed explanation of how these demands were estimated is presented in the Traffic Appendix. These parking constrained volumes were used for both the 1990 and 1995 Build analyses.

TABLE IV.1-16
Parking Constrained Vehicle-Trip Demands

	1990 Initial Build			1995 Full Build		
Time	Fan Pier	Pier 4	Total	Fan Pier	Pier 4	Total
Daily						
In	3,397	1,634	5,031	6,052	3,176	9,228
Out	3,397	1,634	5,031	6,052	3,176	9,228
Total	6,794	3,268	10,062	12,104	6,352	18,456
AM Peak Hour						
In	403	273	676	969	537	1,506
Out	214	77	291	305	136	441
Total	617	350	967	1,274	673	1,947
PM Peak Hour						
In	310	117	427	444	203	647
Out	466	313	779	1,096	637	1,733
Total	776	430	1,206	1,540	840	2,380

NOTE: Trip volumes include delivery vehicles and taxis as well as private automobiles.

Net Additional Peak Hour Trips

The Fan Pier is currently used for long-term (all day) parking for daily commuters to downtown Boston. This parking will be eliminated under the proposed development plan and, as discussed in the Parking Impacts section, no new comparably-priced alternative parking for these commuters is likely to be available. As a result, traffic associated with this activity will be removed from area roadways with the development of the Fan Pier.

In order to determine the net impact of the proposed development, the traffic volumes associated with the existing use have been subtracted from the future Build volumes. However, this was done only for intersections close to the project sites where the existing volumes are large enough to potentially affect the level of service analysis. As a result, Build volumes for all other intersections are slightly overstated because the existing parking traffic was not removed. A similar procedure was utilized in determining background traffic generated by a development parcel that is currently used for parking south of Northern Avenue.

Delivery Vehicle and Taxi Trips

A certain amount of the total daily vehicle generation described above will consist of taxi and delivery vehicle-trips. Delivery vehicles are typically single-unit, two-axle vans and are not large semi-trucks. Table IV.1-17 summarizes the expected delivery vehicle traffic for the office, retail and hotel uses. Only minor amounts of delivery vehicle traffic would be associated with residential uses. Due to the proximity of the Fan Pier and Pier 4 projects, the delivery vehicle rate was applied only to Fan Pier since it is likely multiple stops will be made by delivery vehicles.

TABLE IV.1-17
Daily Delivery Vehicle Arrivals

	Office	Retail	Hotel	Total
Generation Rates	0.21 arrivals/ 1,000 sq. ft.*	0.24 arrivals/ 1,000 sq. ft.*	0.13 arrivals/ room**	
1990 Initial Build Deliveries	115	4	117	236
1995 Full Build Deliveries	311	37	130	478

* Based on Copley Place EIR.
** Based on counts taken at the Marriott Long Wharf Hotel in May, 1985.

At 1995 Full Build, approximately 480 deliveries are expected daily at the proposed developments. The complex would average almost 54 delivery vehicles per hour assuming a constant distribution over a nine-hour day. If it is further assumed that each delivery vehicle arrives and departs within the same hour, then a maximum of approximately 108 delivery-vehicle trips per hour would occur. This volume constitutes approximately six percent of the total morning peak hour volume and five percent of the evening peak hour volume generated by both projects. By comparison, truck traffic currently comprises 18 percent of morning peak hour volumes along Northern Avenue.

As currently planned, service entrances to all structures except one will be provided via the project's internal street system. The only exception would be a Fan Pier parcel along existing Northern Avenue between extended Farnsworth and Pittsburgh Streets. Because of the grades required on these side streets to cross the proposed canal, the service access for the parcel will be on Northern Avenue.

Total taxi traffic is summarized in Table IV.1-18. At Full Build, approximately 720 taxi arrivals per day are expected with more than one-half projected for the hotels and the remainder divided between office and retail uses. The entrances to the hotels will provide areas for picking up and discharging passengers. However, based on the projected volumes, there will also be a need to provide taxi holding areas near the major office buildings.

TABLE IV.1-18
Daily Taxi
Arrivals

	Office	Retail	Hotel	Total
Generation Rates	0.75 arrivals/ 100 person-trips*	0.75 arrivals/ 100 person-trips*	0.325 arrivals/ room**	
1990 Initial Build				
Fan Pier	56	5	292	353
Pier 4	23	16	823	121
Total	79	21	374	474
1995 Full Build				
Fan Pier	150	45	325	520
Pier 4	60	56	82	198
Total	210	101	407	718

* Based on Highway Research Board, NCHRP Report No. 62, Urban Travel Patterns for Hospitals, Universities, Office Buildings and Capitols, 1969.

** Based on counts taken at the Marriott Long Wharf Hotel in May, 1985.

- **Background Traffic Growth**

Area traffic growth is a function of other new development in the area. This growth can be projected by the application of a generalized growth factor or by the assessment of specific development proposals. For this analysis, a combination of both approaches was used. Although information was available about possible new development in both South Boston and downtown Boston (see Background Development Assumptions Appendix for traffic related issues), the downtown information was limited to development expected through 1990. In order to account for downtown development through 1995, the analysis year for Full-Build of the projects, an additional five percent growth in downtown background volumes was added. This factor was based on the growth in person-trips between 1972 and 1982 reported in the 1982 Cordon Count for downtown Boston (see Traffic Appendix for more detail).

The anticipated traffic from each background development in South Boston and downtown was added to the base network volumes to determine the No-Build conditions. Traffic studies were available for many of the projects and provided detailed information on projected AM and PM peak hour volumes. In cases where such volumes were not available, the trip generation equations used to calculate Fan Pier and Pier 4 traffic were used to calculate background development traffic based on the proposed use and size of each development. For downtown office and retail background developments, mode split factors were modified to reflect higher transit usage. For industrial uses, rates from the Institute of Transportation Engineer's (ITE) publication Trip Generation were modified and used. The ITE industrial vehicle-trip rates were reduced to reflect the higher transit usage and vehicle occupancy rates expected in both South Boston and downtown. The Traffic Appendix provides listings of the trip generation assumptions used and the expected daily and peak hour volumes for each background development.

■ Trip Distribution

Generated vehicle-trips from the Fan Pier and Pier 4 and other background development were distributed over the projected roadway system. This distribution was based on data available from a license plate survey of vehicles parked on the Fan Pier and Cabot, Cabot & Forbes parcels provided by the Central Transportation Planning Staff (CTPS). Table IV.1-19 illustrates the directional distribution used. The distribution was compared against the distribution used for the International Place EIR and the distribution based on the 1982 Cordon Count to verify the appropriateness of its use. The Traffic Appendix provides more detailed information on the development of the project trip distribution and shows a comparison of the distribution used with the 1982 Cordon Count and International Place EIR distributions.

In addition to determining the distribution of traffic to major routes in and out of the City, consideration was also given to alternative local routings between these major highways and the sites. Of particular concern were the local South Boston streets which would be used by Southeast Expressway and Massachusetts Turnpike traffic.

TABLE IV.1-19
Trip Distribution by Major Route

Major Route	Percent
Route 1 (Tobin Bridge)	11
Interstate 93 (North)	14
Route 3 (North)	6
Route 2	8
Massachusetts Turnpike (I-90)	15
Boston Street/Dorchester Avenue	2
Southeast Expressway/Morrissey Blvd.	44
Total	100

Source: CTPS License Plate Survey of Cars Parked on Fan Pier and CC&F parcels.

Traffic from these highways can reach the site via several routes through South Boston as well as from downtown across the Fort Point Channel bridges. The various routes through South Boston include L Street/Day Boulevard; D Street/Old Colony Avenue; A Street/Dorchester Avenue/Old Colony Avenue; and A Street/West Broadway. Westbound and southbound traffic was assigned to these routes and to the relocated Northern Avenue, Summer Street and Congress Street bridges across the Fort Point Channel based on a comparison of average peak hour travel times along these routes between the developments and the various access points to the Turnpike and Expressway.

One final consideration with regard to assignment of trips to the network was the status of the proposed Third Harbor Tunnel and Seaport Access Road. The Initial Build analysis assumed no Third Harbor Tunnel. The impacts of the Full Build development on area highways were analyzed separately for a roadway network with and without the Third Harbor Tunnel. With the proposed tunnel, certain trips such as those to East Boston or to the Turnpike would be loaded directly onto the Seaport Access Road rather than via South Boston and downtown roadways. The projected volumes for 1990 No-Build and Build without the Third Harbor Tunnel and for 1995 No-Build and Build conditions with and without the Third Harbor Tunnel are shown in Figures IV.1-9 through IV.1-20 contained in the following section.

■ Roadway Impacts

Introduction

The analysis of roadway impacts was conducted for three "Build" scenarios: 1990 Initial Build without the Third Harbor Tunnel; 1995 Full Build without the Third Harbor Tunnel; and 1995 Full Build with the Third Harbor Tunnel.

The 1995 scenario with the Tunnel was based on Alternative 5A Modified of the Central Artery/Third Harbor Tunnel and included the Harbor Tunnel itself, the Seaport Access Road through South Boston, and the Depressed Central Artery through downtown Boston.

Each scenario was analyzed for No-Build and Build conditions in the morning and evening peak hours. The analysis of Build conditions was done for parking constrained Fan Pier and Pier 4 trip generation, as mentioned previously. Figures IV.1-9 through IV.1-20 depict morning and evening peak hour turning volumes under No-Build and Build conditions for the three scenarios.

Evening Peak Hour Volumes

Throughout the Boston area, PM (evening) traffic volumes are the highest experienced during the day. Similarly, the highest volumes generated by Pier 4 and Fan Pier occur in the afternoon. To illustrate the impact of Fan Pier and Pier 4 traffic, Tables IV.1-20 through IV.1-22 show evening traffic increases on selected study area roadways for each of the three study scenarios. In 1990 the largest volume increases from the project are on the Northern Avenue Bridge with almost 300 trips and on A Street north of Broadway and on Old Colony Avenue south of D Street, each with more than 200 trips. The largest percentage increase is on A Street which experiences a 24 percent increase. This is almost twice the increase at any other location and results from the low base volume. Other locations with increases in excess of 10 percent are the Northern Avenue Bridge, West Fourth Street Bridge, D Street at Summer Street and L Street south of Broadway.

At Full Build in 1995, Fan Pier/Pier 4 generated volumes add more than 800 vehicles to the Northern Avenue Bridge during the afternoon peak hour. In the same time period, the sites add 425 vehicles to A Street and a similar volume (427) to Old Colony Avenue. The largest percentage increases in 1995 are seen on "A" Street (38 percent), Northern Avenue Bridge (28 percent) and N. Fourth Street Bridge (23 percent).

With the inclusion of the Third Harbor Tunnel, substantial diversions of Fan Pier/Pier 4 volumes can be expected from the existing street system. More than 300 trips would be shifted from the Northern Avenue Bridge. Old Colony Avenue would see a shift of almost 300 vehicles, while Atlantic Avenue would see a shift of 240 trips. Other large decreases in project trips would occur on L Street (about 220 fewer trips), the West Fourth Street Bridge (210 trips), D Street (135 trips), Summer Street (110 trips), and the Broadway Bridge (100 trips). With the exception of the Fort Point Channel crossings, the Seaport Access Road and Third Harbor Tunnel decrease local street volumes to lower than expected with the 1990 Build Scenario.

TABLE IV.1-20
1990 PM Peak
Hour Roadway
Increases

Corridor	Existing Volume	No-Build Volume	Build Volume	Increase from No-Build to Build Amount	Increase from No-Build to Build Percent
Atlantic Avenue north of Northern Avenue	2,271	3,913	4,038	125	3.2
Northern Avenue Bridge	1,731	2,265	2,556	291	12.8
Congress Street Bridge	1,816	1,850	1,904	54	2.9
Summer Street Bridge	1,326	1,393	1,424	31	2.2
A Street north of Broadway	794	886	1,096	210	23.7
Broadway Bridge	2,301	2,400	2,447	47	2.0
West Fourth Street Bridge	887	1,003	1,118	115	11.5
Dorchester Avenue south of Old Colony Avenue	737	818	840	22	2.7
D Street south of Summer Street	612	920	1,039	119	12.9
Old Colony Avenue south of D Street	2,314	2,513	2,725	212	8.4
L Street south of Broadway	1,118	1,327	1,473	146	11.0

TABLE IV.1-21
1995 PM Peak Hour Roadway Increases Without Third Harbor Tunnel

Corridor	Existing Volume	No-Build Volume	Build Volume	Increase from No-Build to Build Amount	Increase from No-Build to Build Percent
Atlantic Avenue north of Northern Avenue	2,271	4,472	5,060	588	13.1
Northern Avenue Bridge	1,731	2,923	3,755	832	28.5
Congress Street Bridge	1,816	1,966	2,065	99	5.0
Summer Street Bridge	1,326	1,508	1,621	113	7.5
A Street north of Broadway	794	1,119	1,544	425	38.0
Broadway Bridge	2,301	2,525	2,628	103	4.1
West Fourth Street Bridge	887	1,133	1,344	211	18.6
Dorchester Avenue south of Old Colony Avenue	737	888	933	45	5.1
D Street south of Summer Street	612	1,205	1,396	191	15.9
Old Colony Avenue south of D Street	2,314	2,826	3,253	427	15.1
L Street south of Broadway	1,118	1,575	1,867	292	18.5

TABLE IV.1-22
1995 PM Peak Hour Roadway Increases With Third Harbor Tunnel

Corridor	Existing Volume	No-Build Volume	Build Volume	Increase from No-Build to Build Amount	Increase from No-Build to Build Percent
Atlantic Avenue north of Northern Avenue	2,271	3,222	3,571	349	10.8
Northern Avenue Bridge	1,731	2,381	2,882	501	21.0
Congress Street Bridge	1,816	2,015	2,069	54	2.7
Summer Street Bridge	1,326	1,484	1,484	0	0.0
A Street north of Broadway	794	651	745	94	14.4
Broadway Bridge	2,301	2,079	2,079	0	0.0
West Fourth Street Bridge	887	920	920	0	0.0
Dorchester Avenue south of Old Colony Avenue	737	664	687	23	3.5
D Street south of Summer Street	612	643	699	56	8.7
Old Colony Avenue south of D Street	2,314	2,254	2,395	141	6.3
L Street south of Broadway	1,118	1,274	1,344	70	5.5

FIGURE IV.1-9a 1990 AM No-Build Volumes

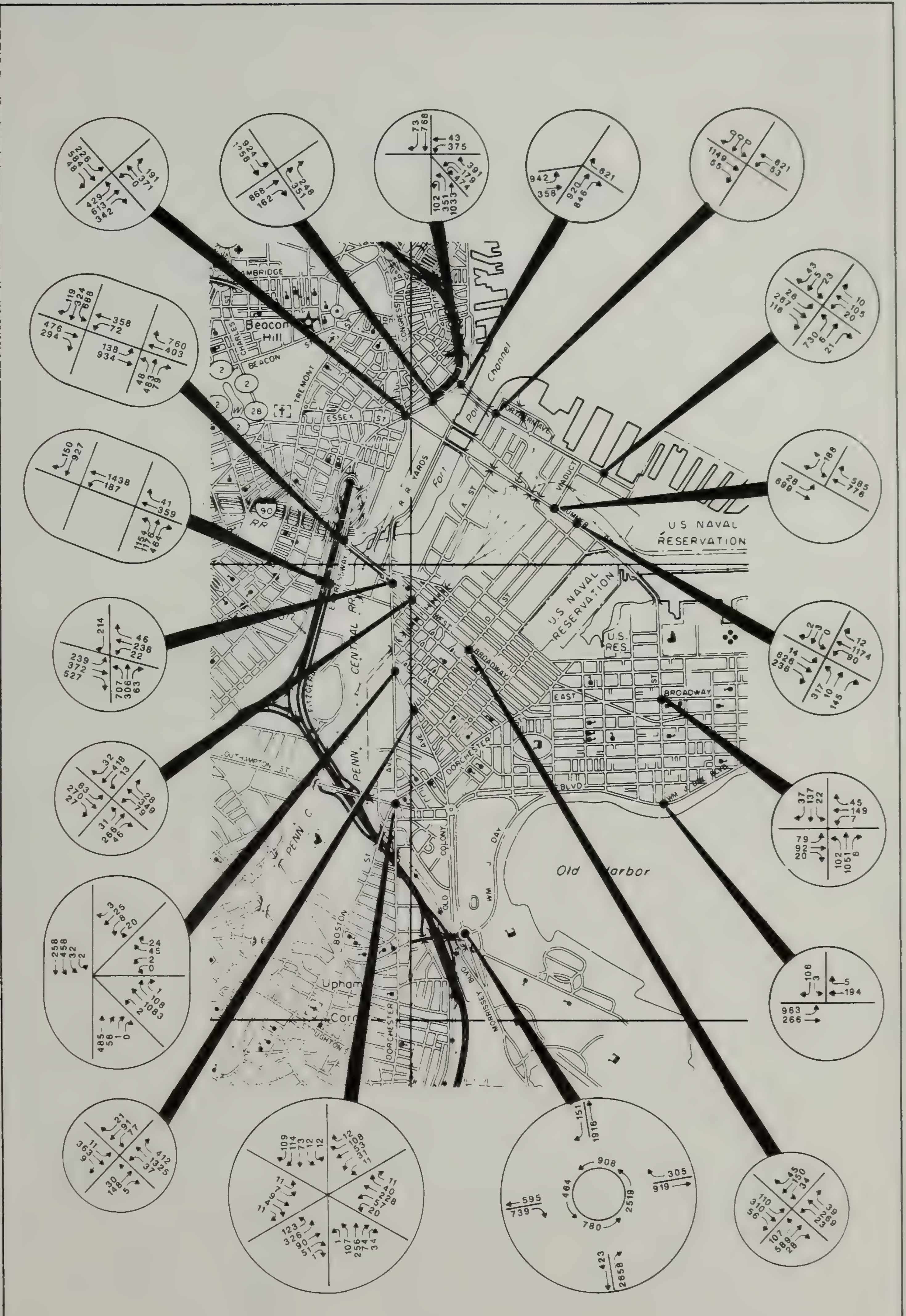


FIGURE
IV.1-9b
1990 AM
No-Build
Volumes

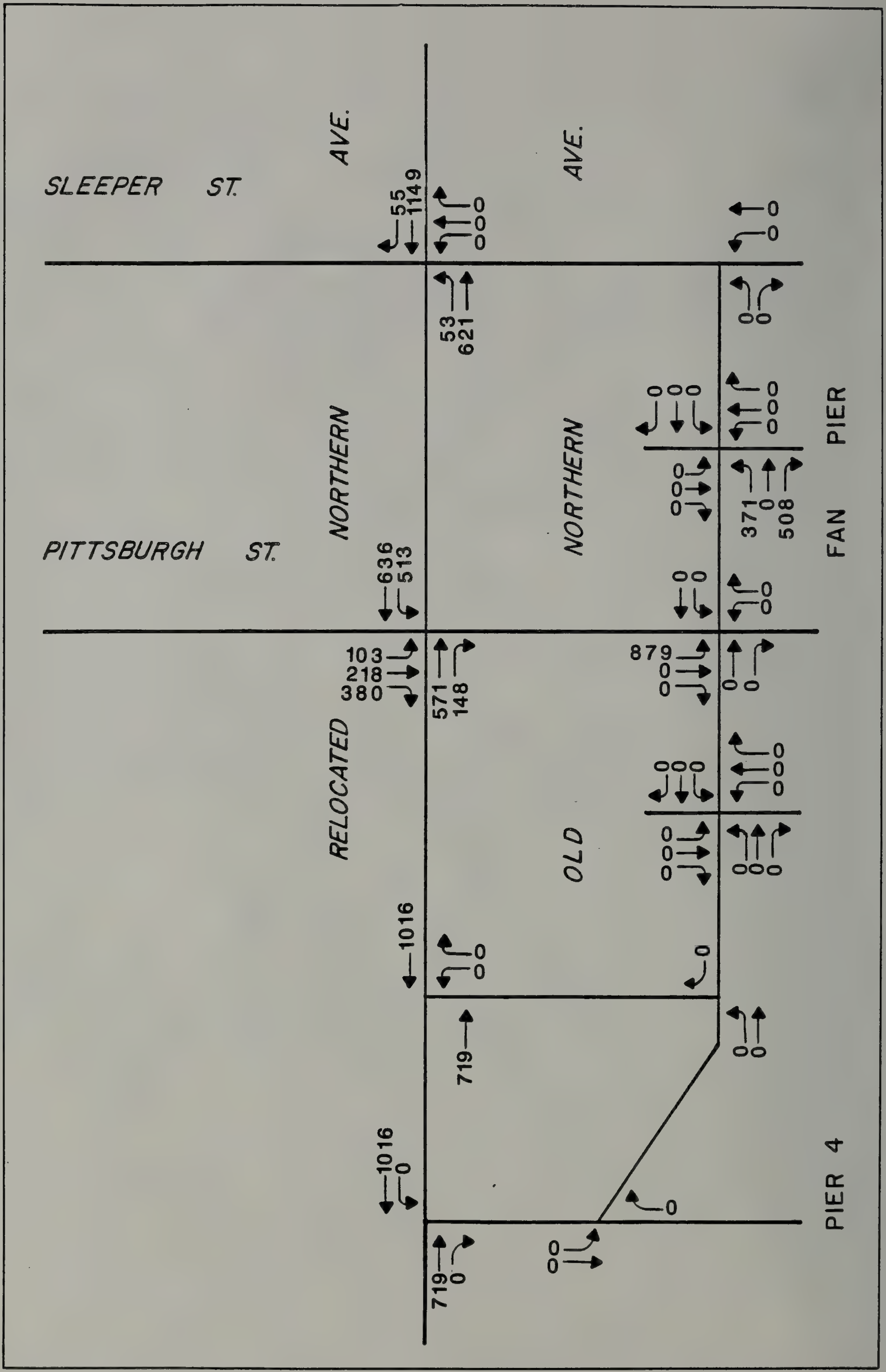


FIGURE
IV.1-10a
1990 PM
No-Build
Volumes

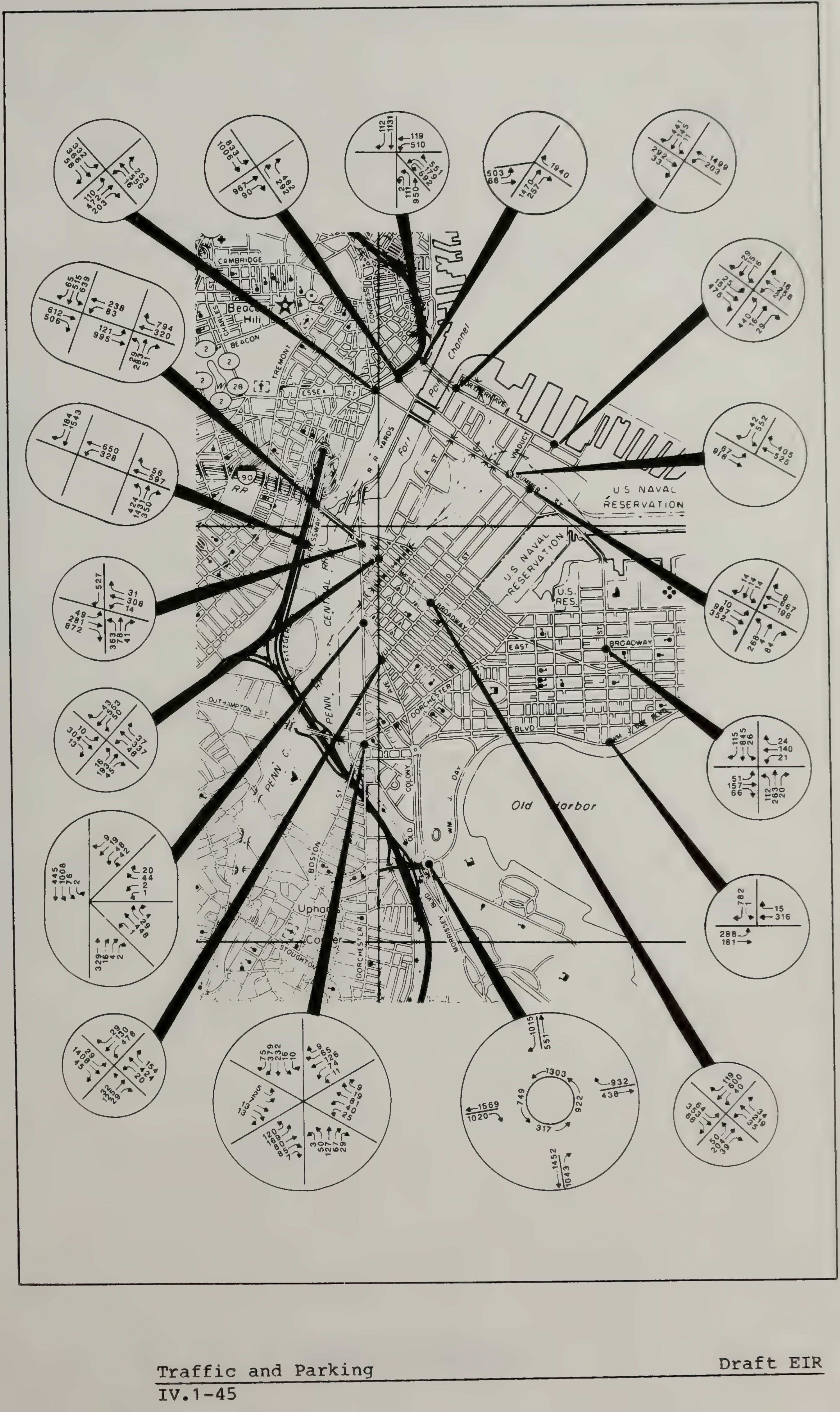


FIGURE
IV.1-10b
1990 PM
No-Build
Volumes

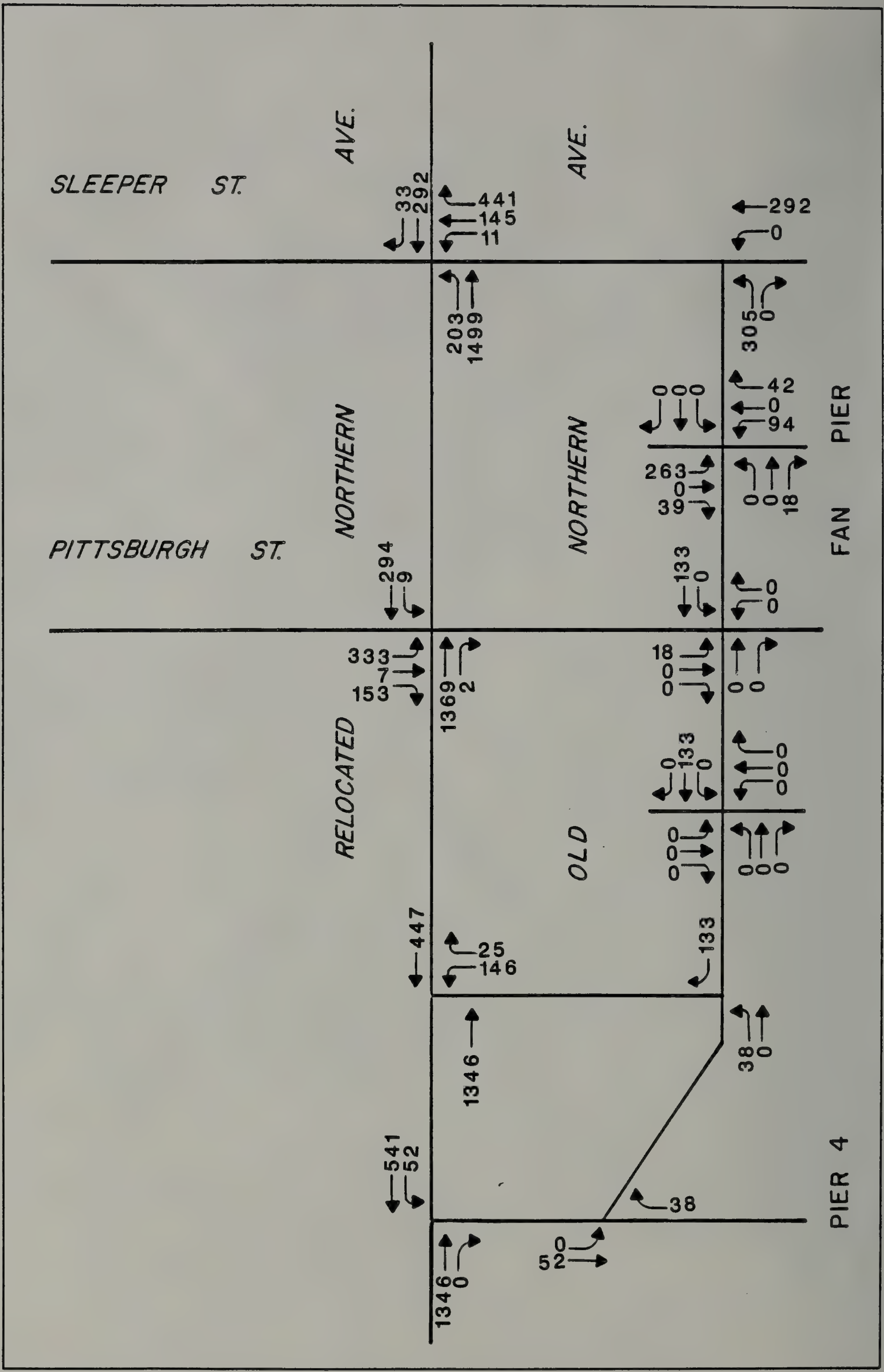


FIGURE
IV.1-11a
1990 AM Build
Volumes

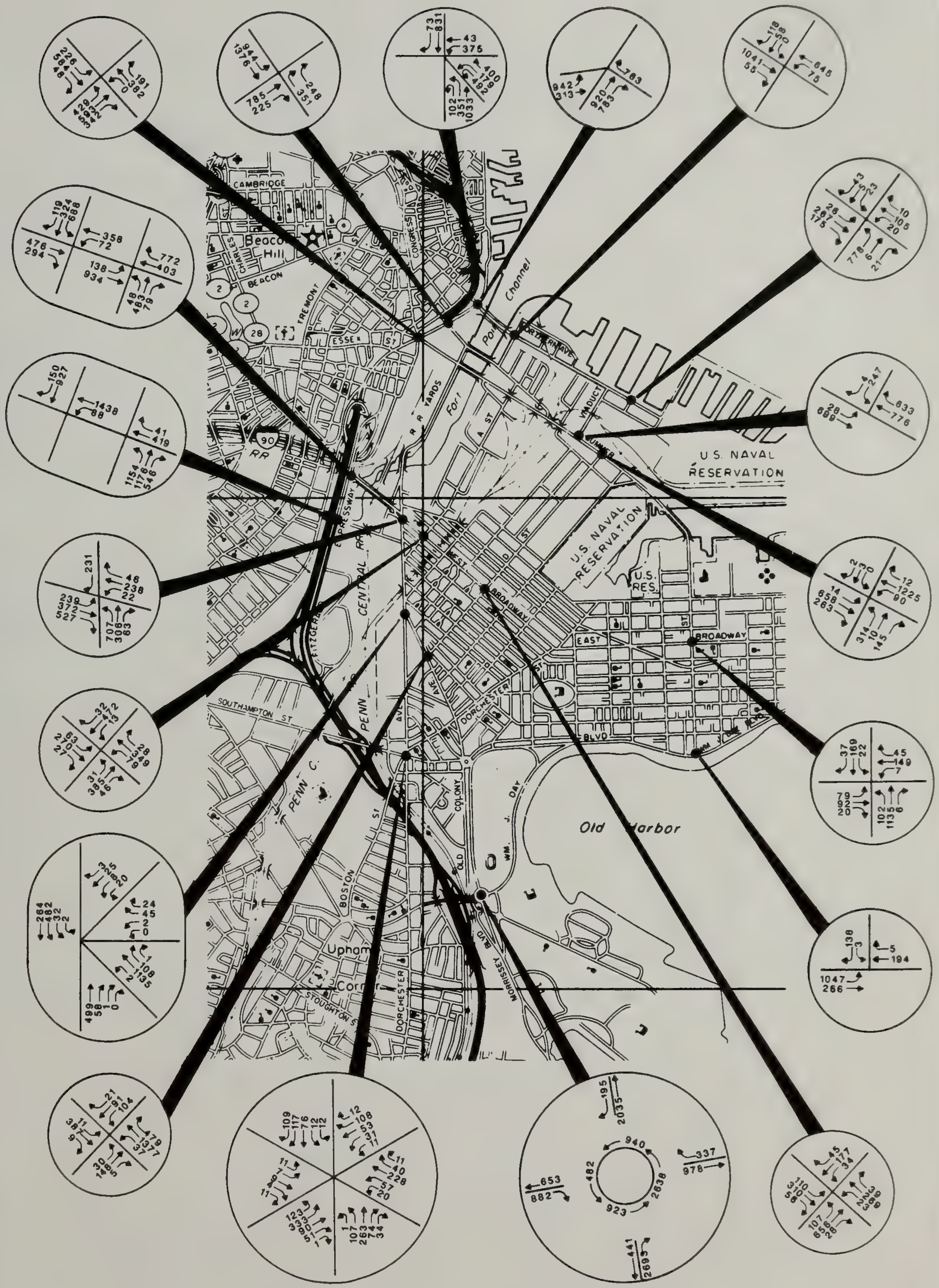


FIGURE
IV.1-11b
1990 AM Build
Volumes

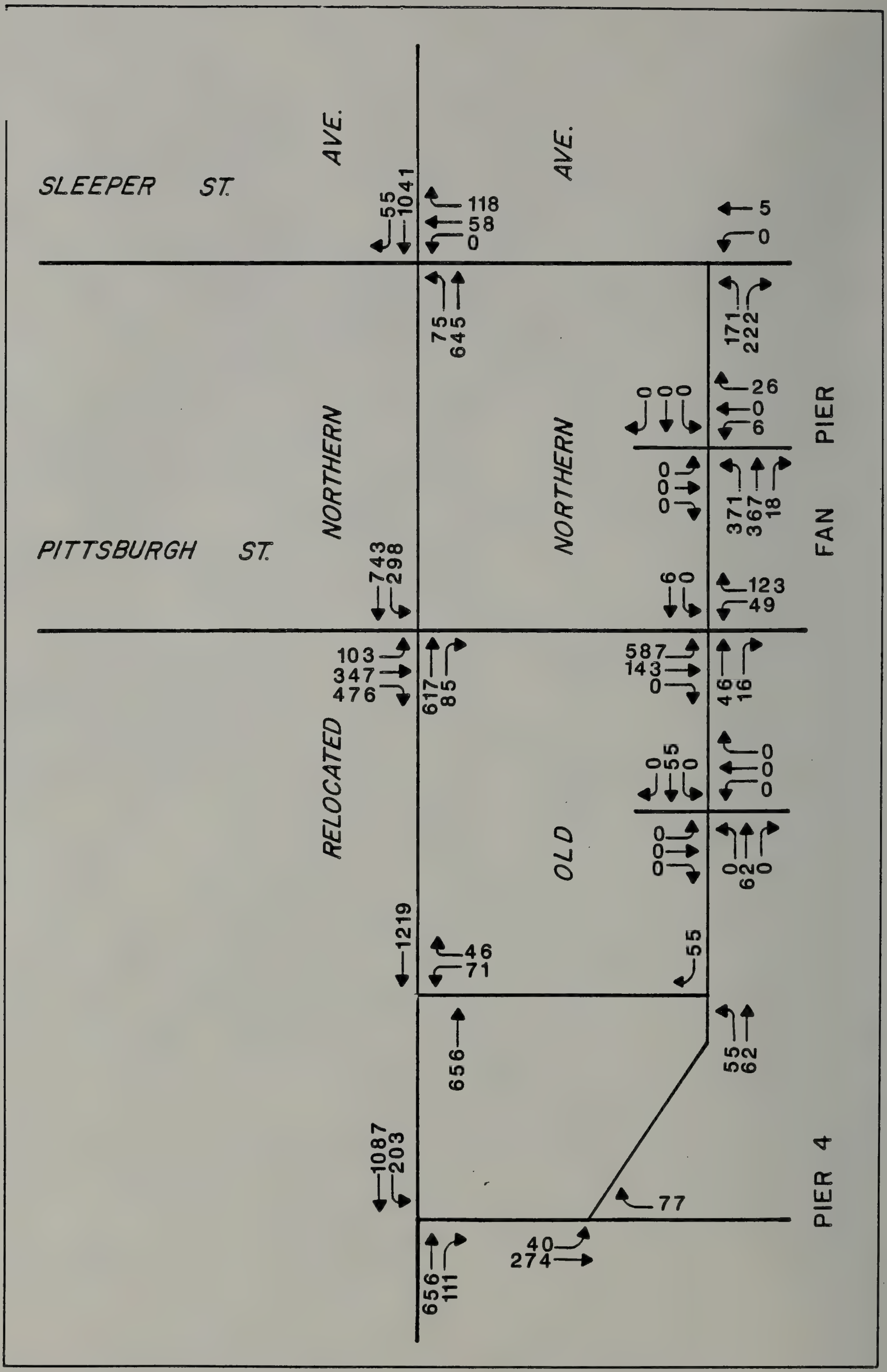


FIGURE
IV.1-12a
1990 PM Build
Volumes

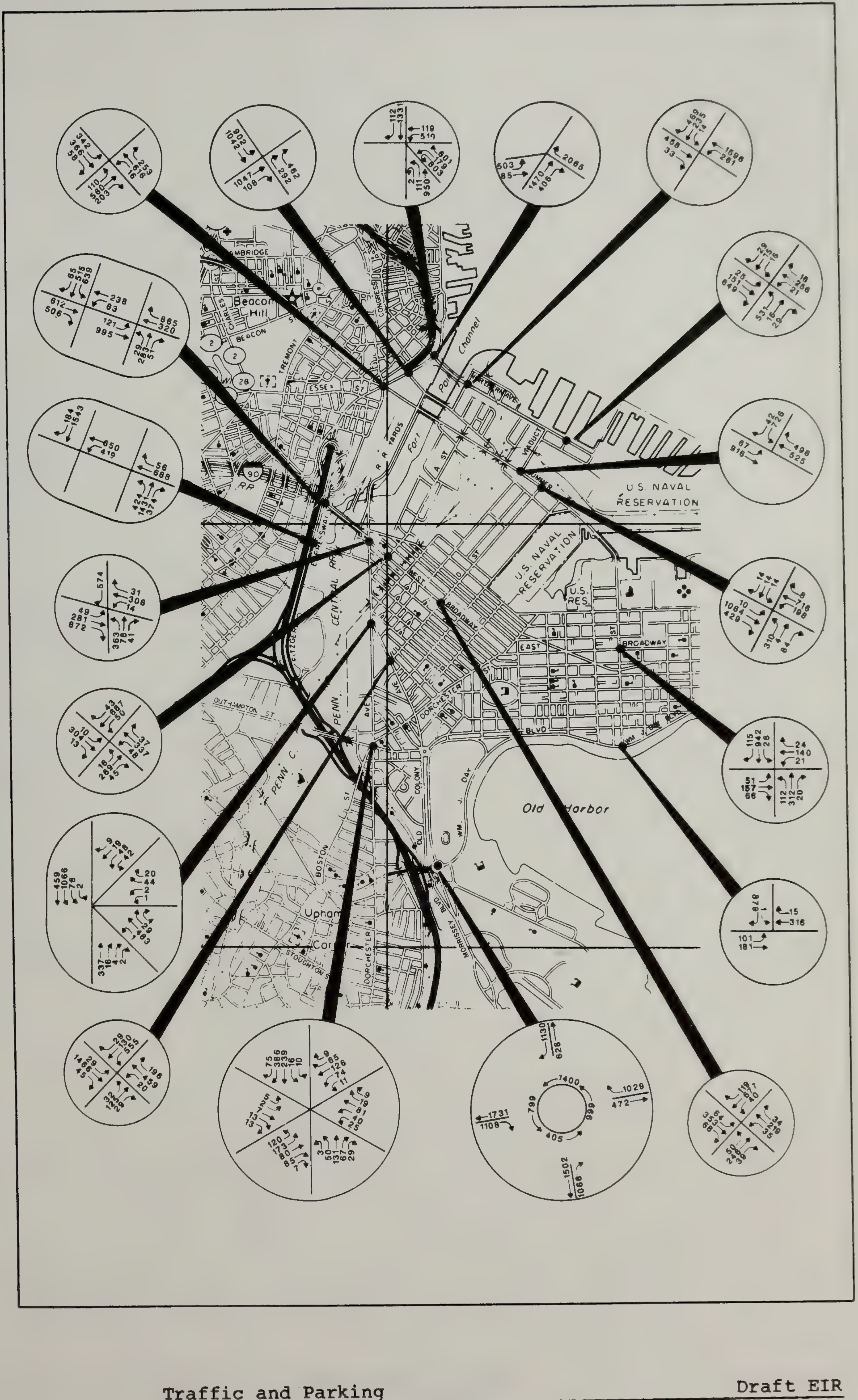


FIGURE
IV.1-12b
1990 PM Build
Volumes

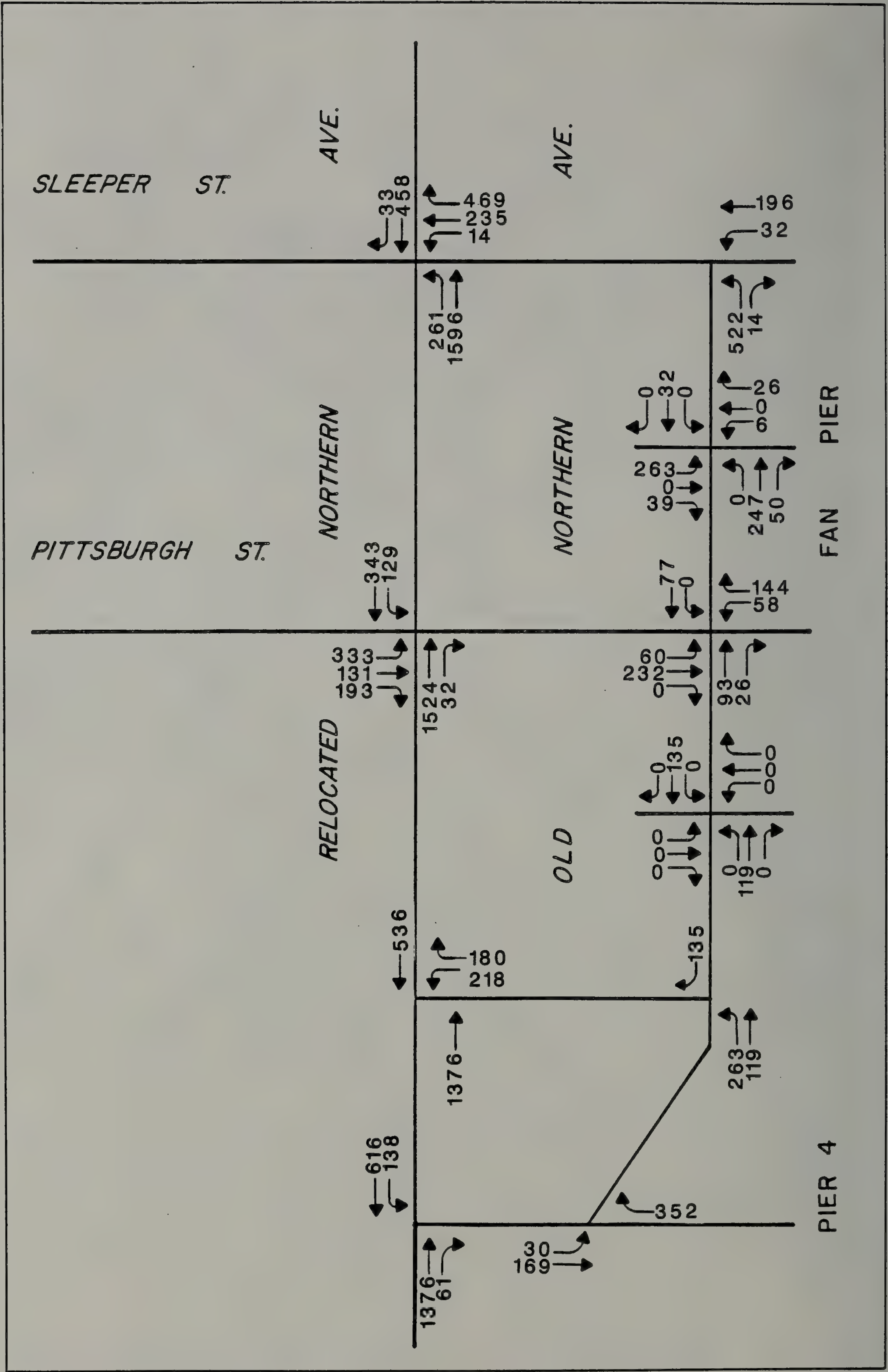


FIGURE
IV.1-13a
1995 AM
No-Build
Volumes
Without Third
Harbor Tunnel

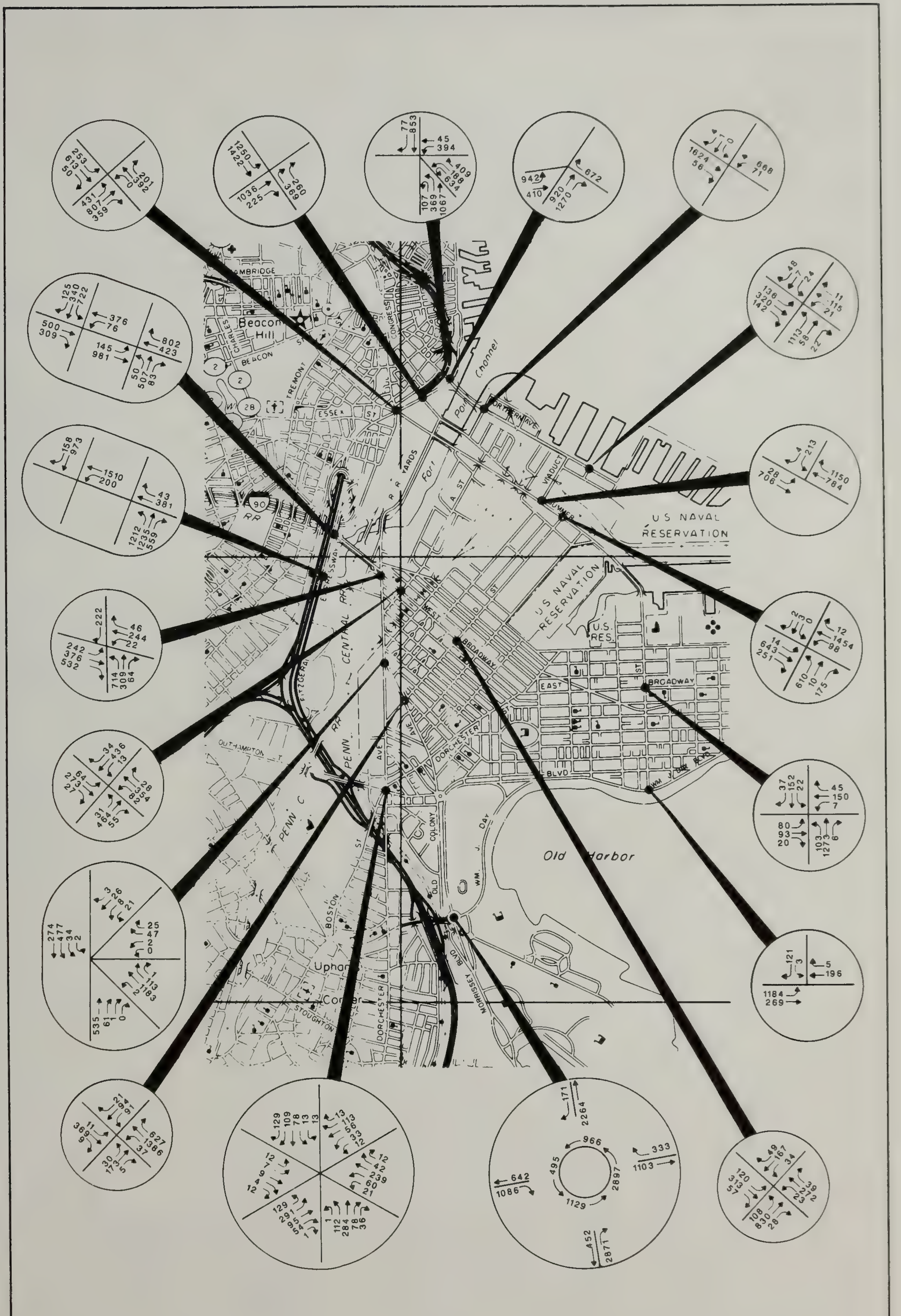


FIGURE
IV.1-13b
1995 AM
No-Build
Volumes
Without Third
Harbor Tunnel

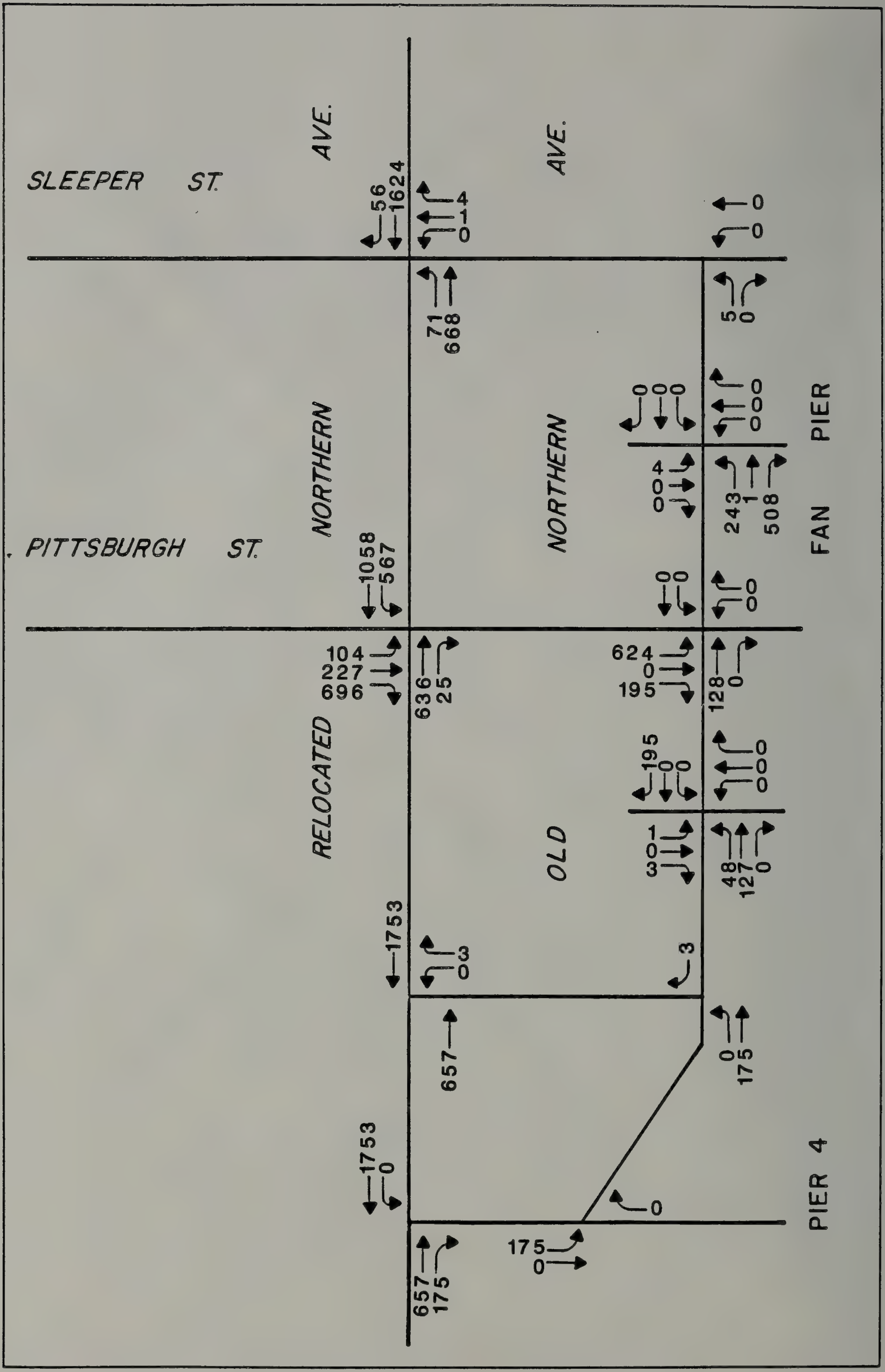


FIGURE
IV.1-14a
1995 PM
No-Build
Volumes
Without Third
Harbor Tunnel

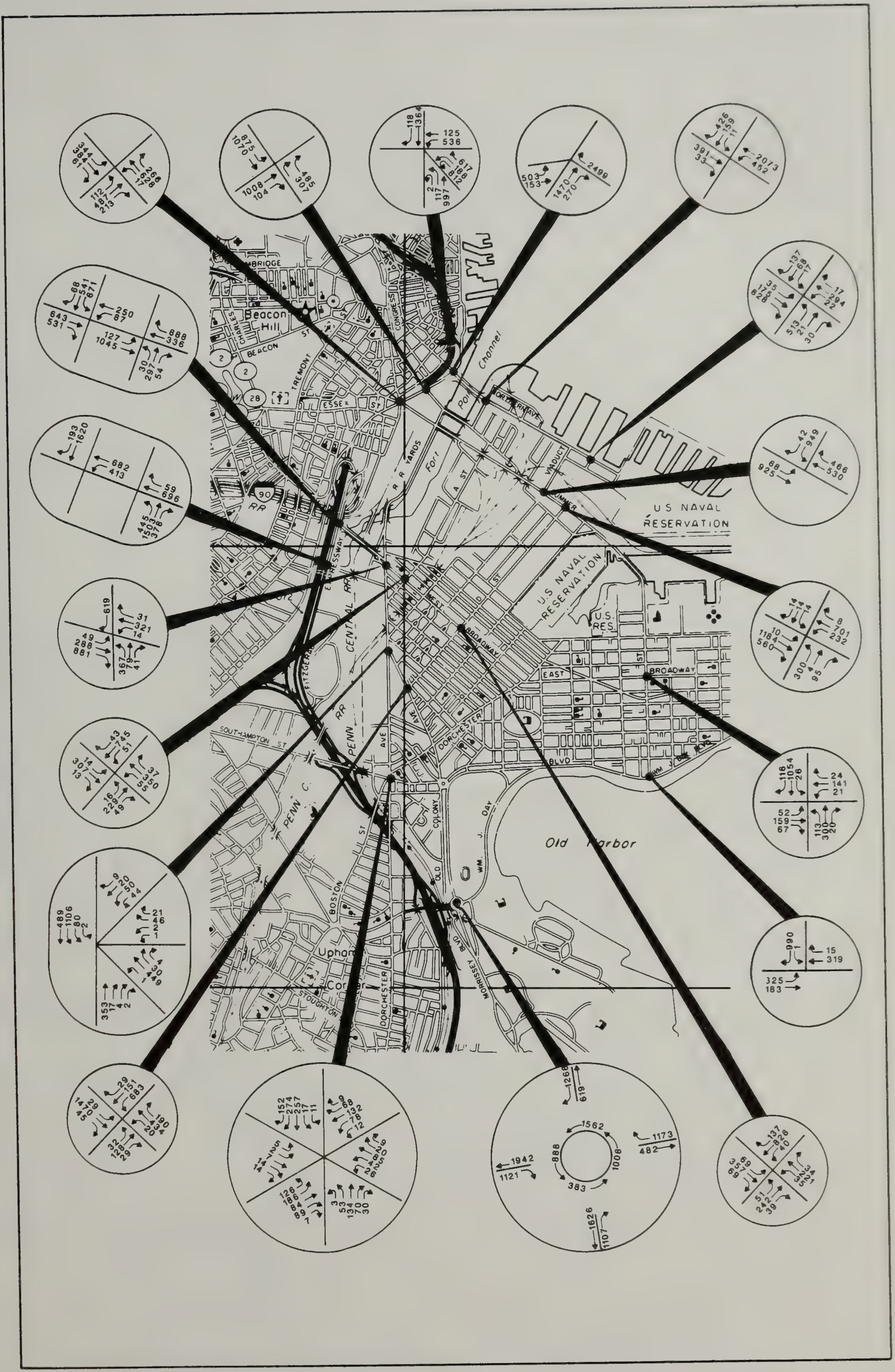


FIGURE
IV.1-14b
1995 PM
No-Build
Volumes
Without Third
Harbor Tunnel

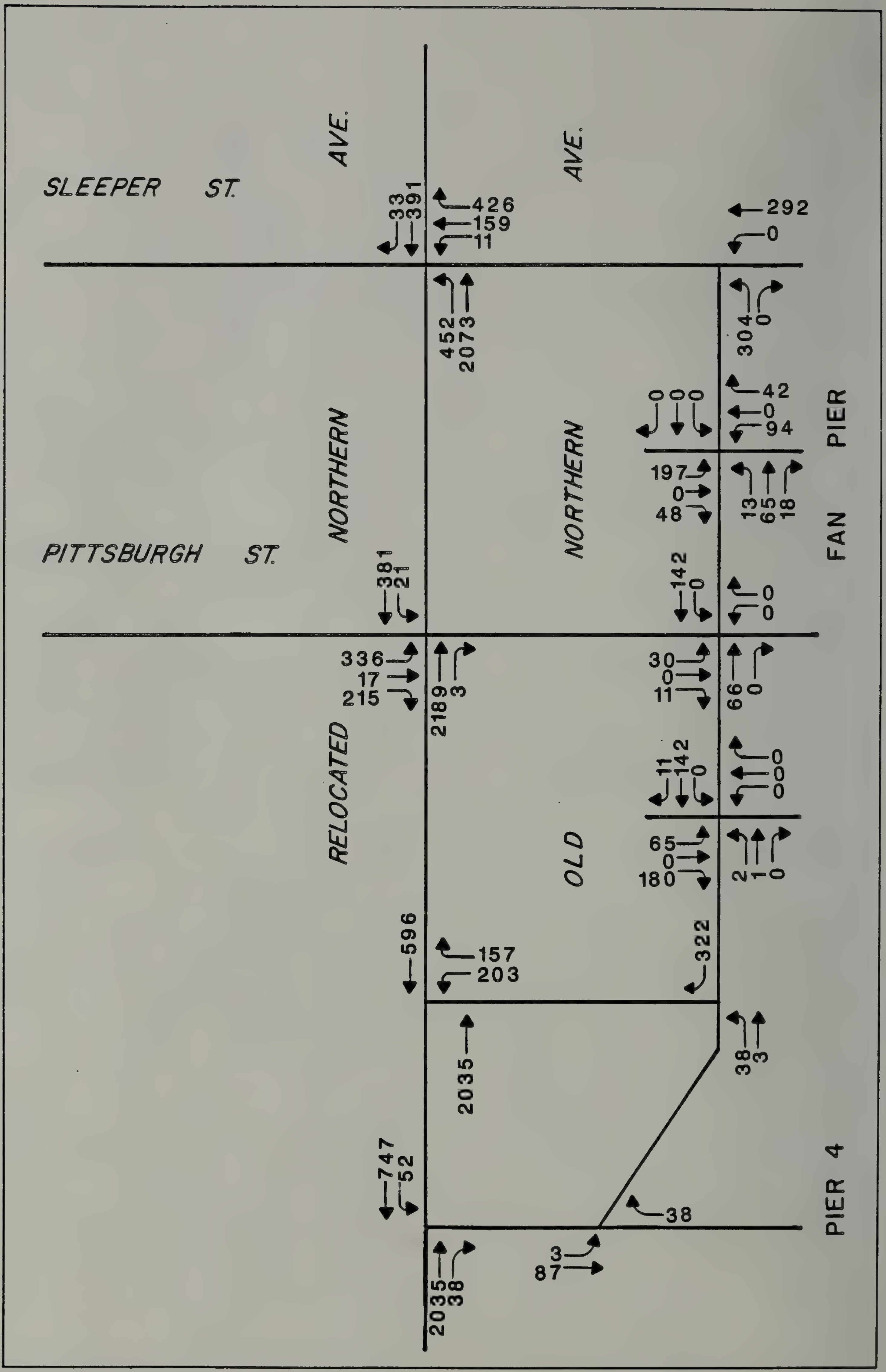


FIGURE
IV.1-15a
1995 AM Build
Volumes
Without Third
Harbor Tunnel

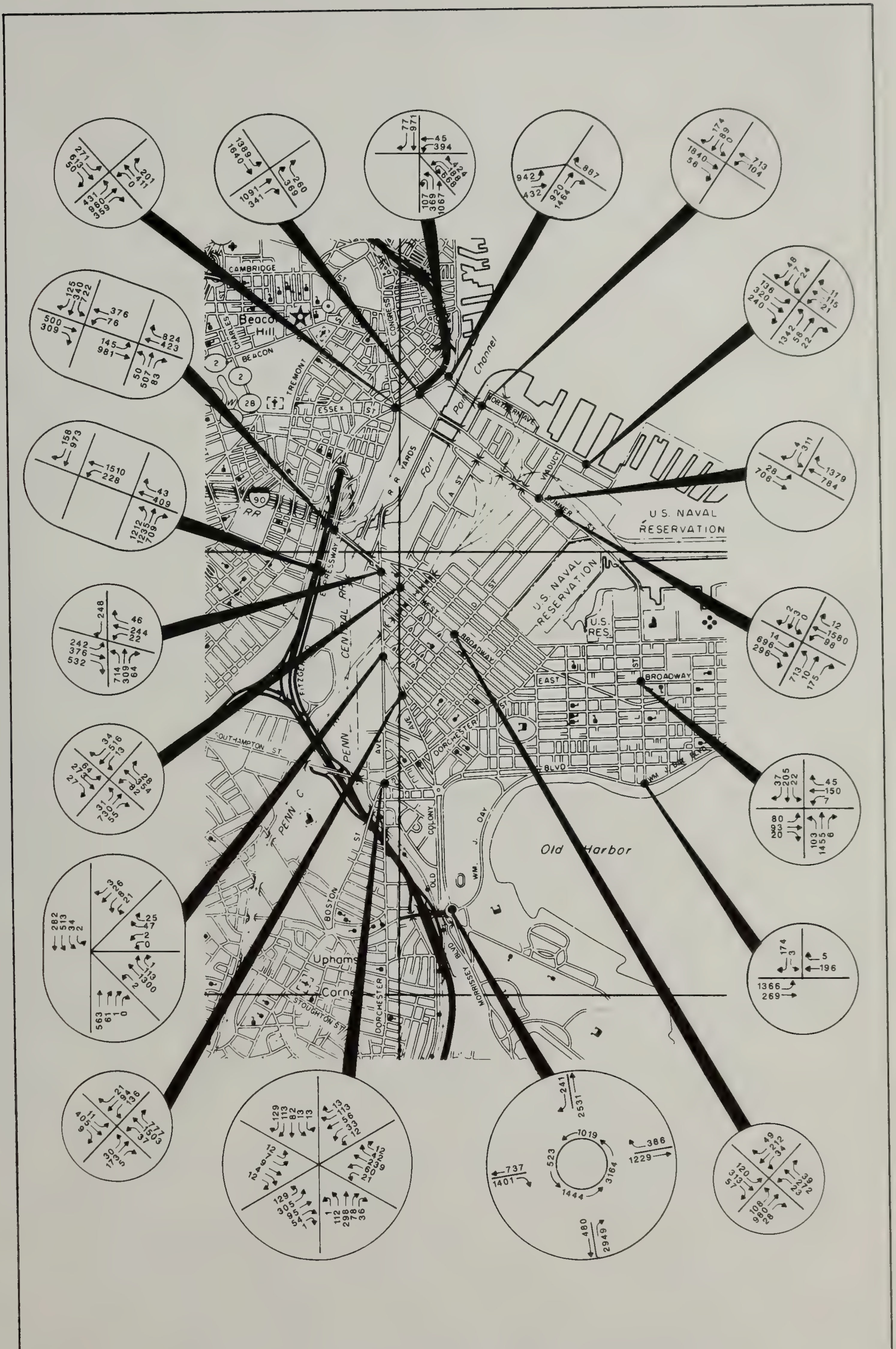


FIGURE
IV.1-15b
1995 AM Build
Volumes
Without Third
Harbor Tunnel

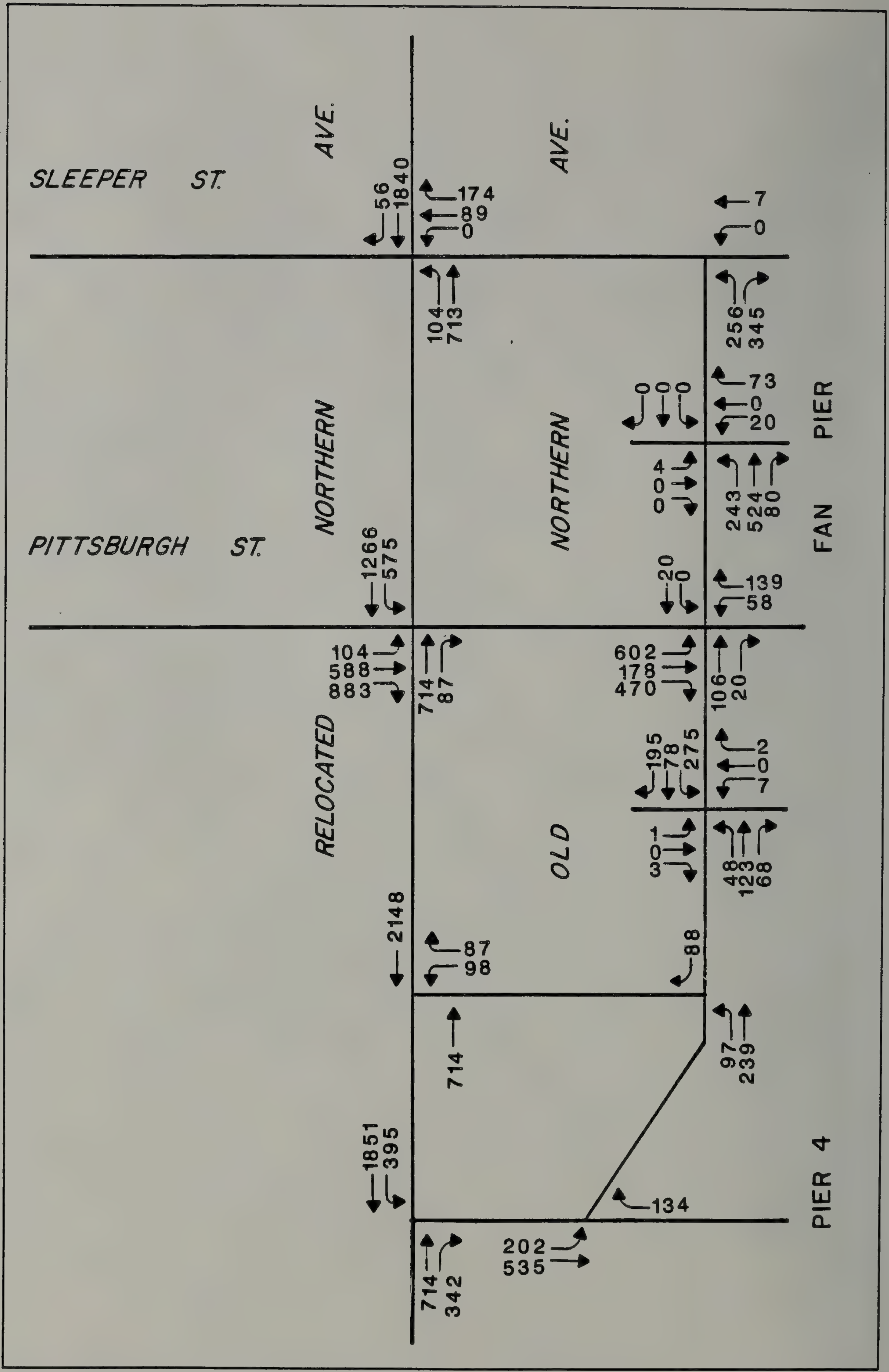


FIGURE
IV.1-16a
1995 PM Build
Volumes
Without Third
Harbor Tunnel

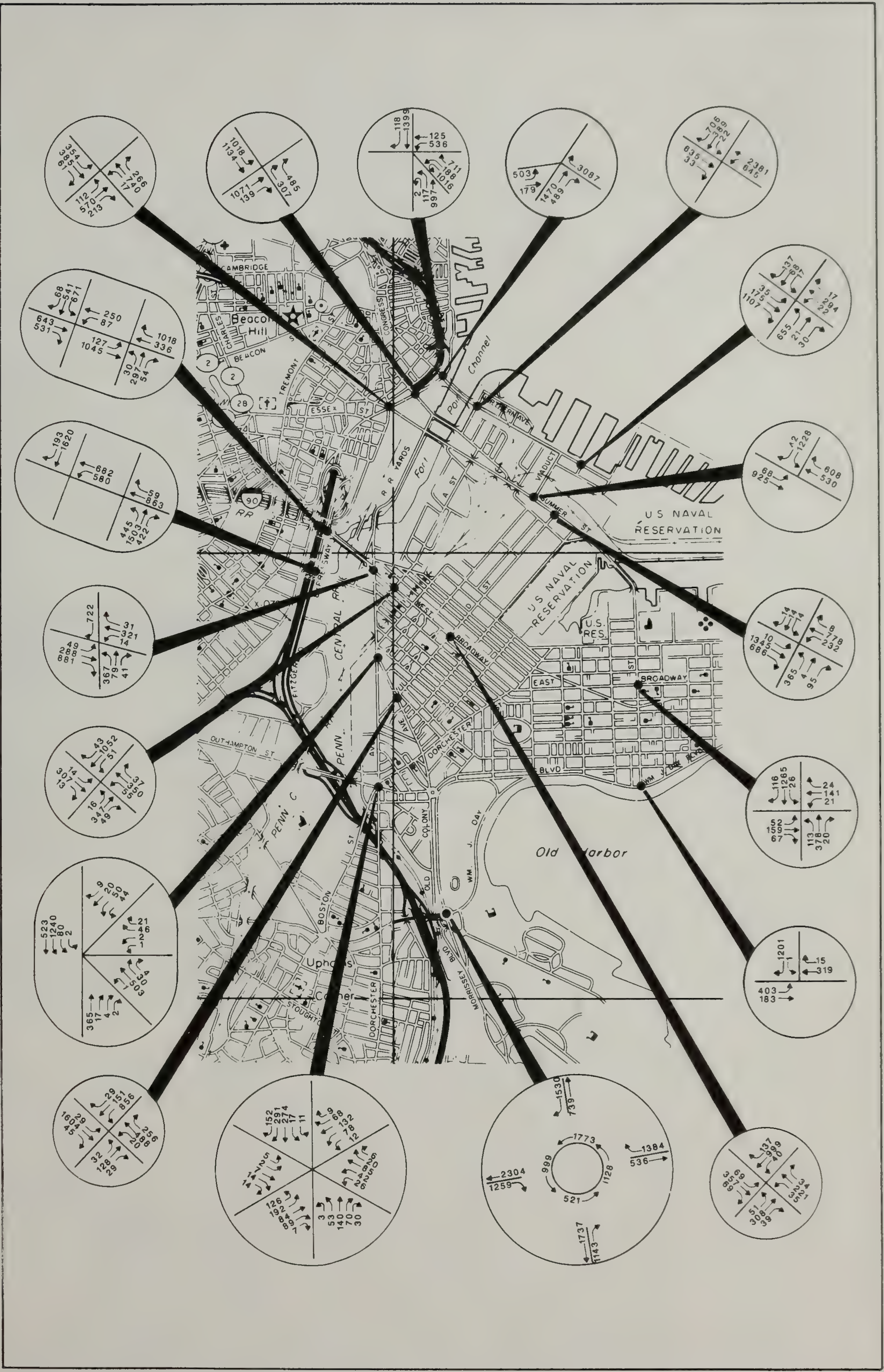


FIGURE
IV.1-16b
1995 PM Build
Volumes
Without Third
Harbor Tunnel

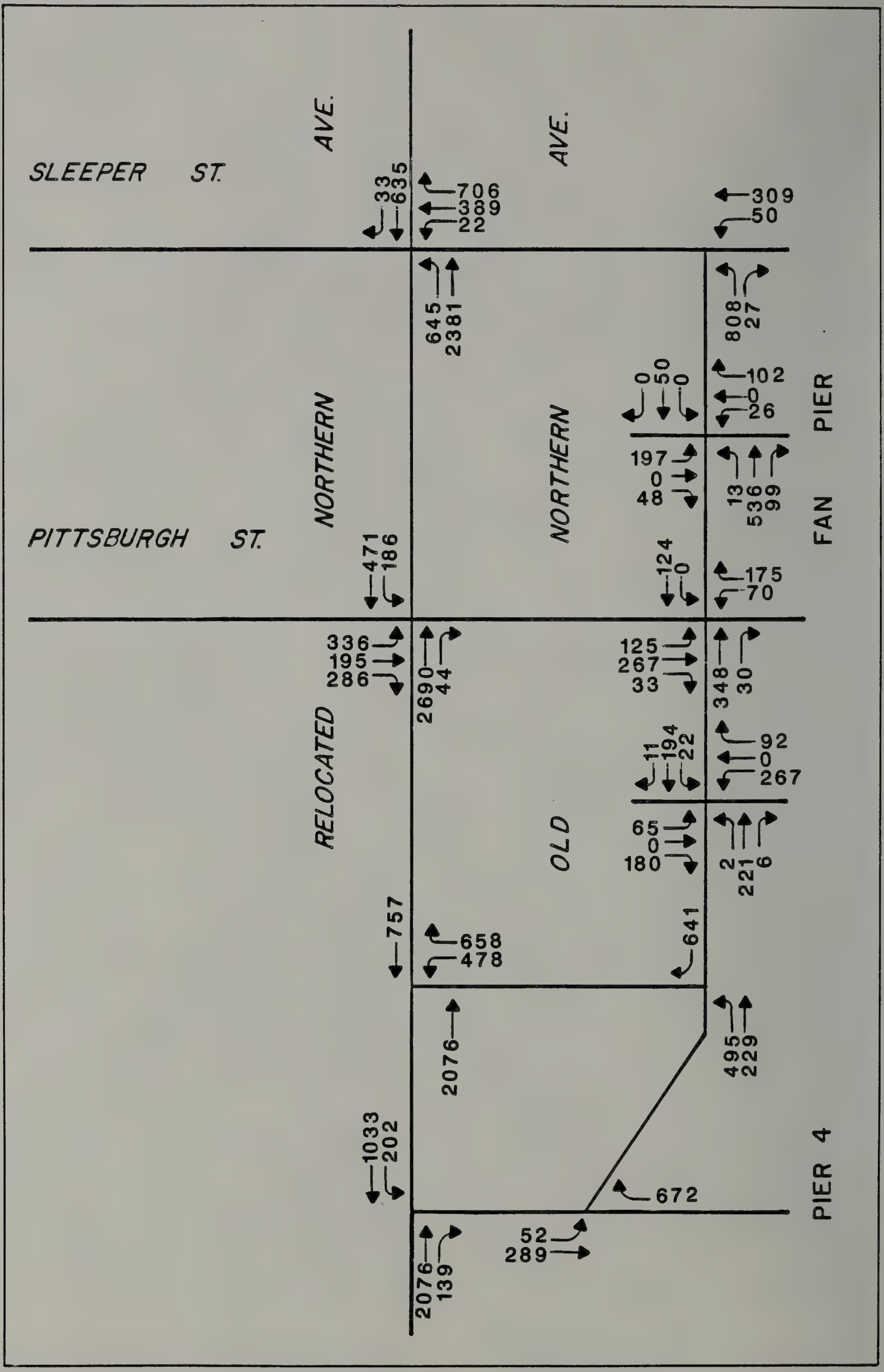


FIGURE
IV.1-17a
1995 AM
No-Build
Volumes With
Third Harbor
Tunnel

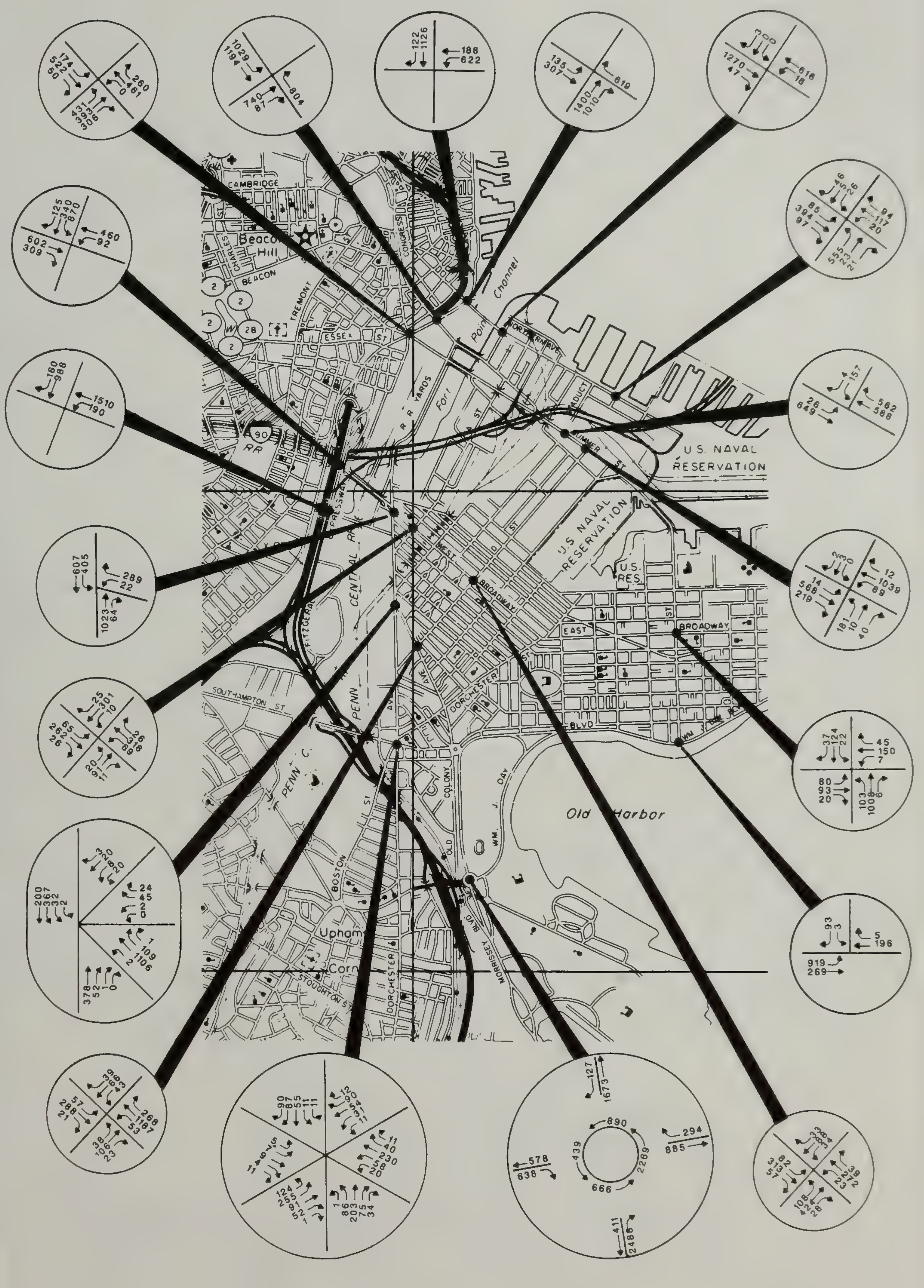


FIGURE
IV.1-17b
1995 AM
No-Build
Volumes With
Third Harbor
Tunnel

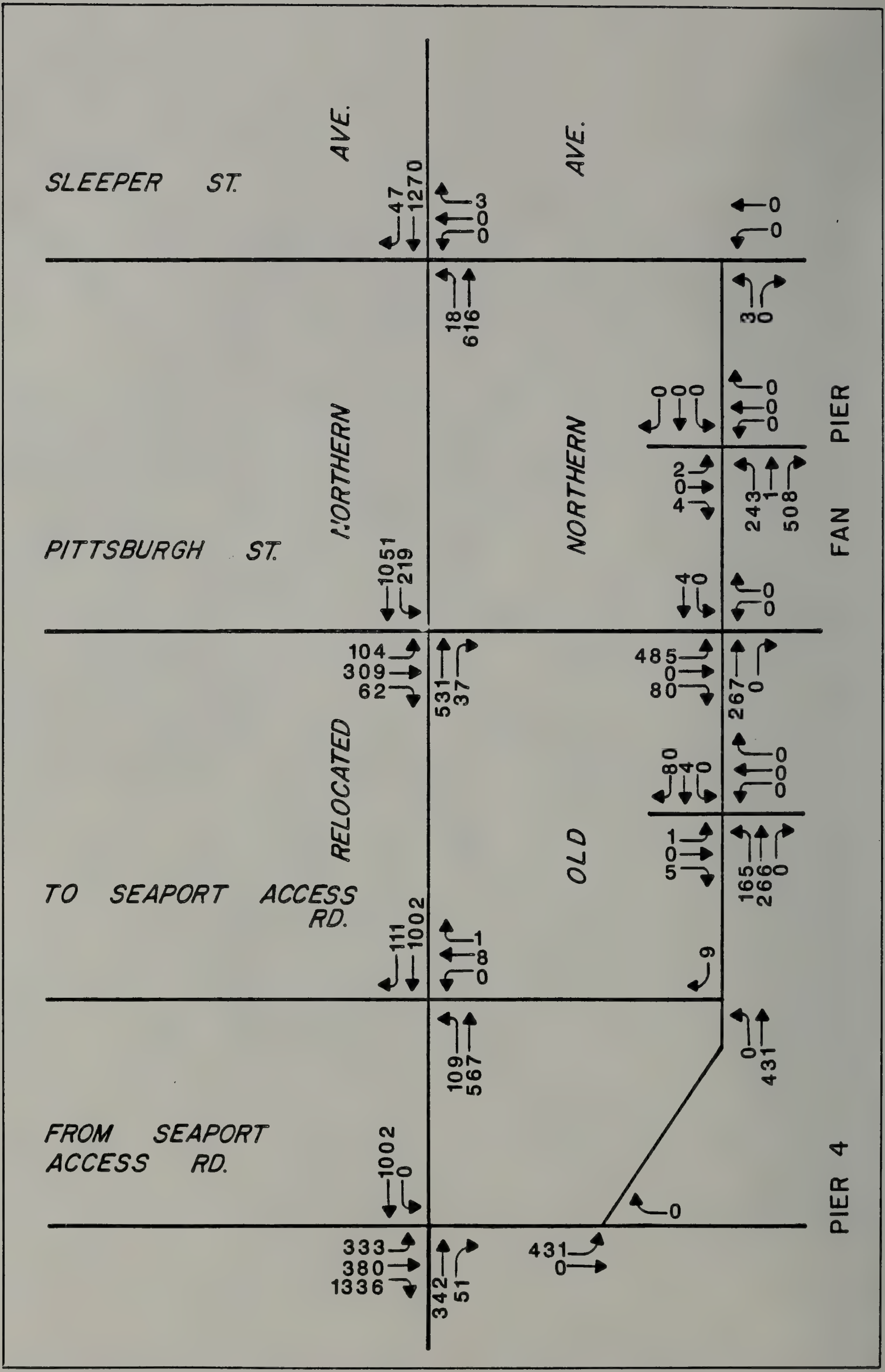


FIGURE IV.1-18a 1995 PM No-Build Volumes With Third Harbor Tunnel

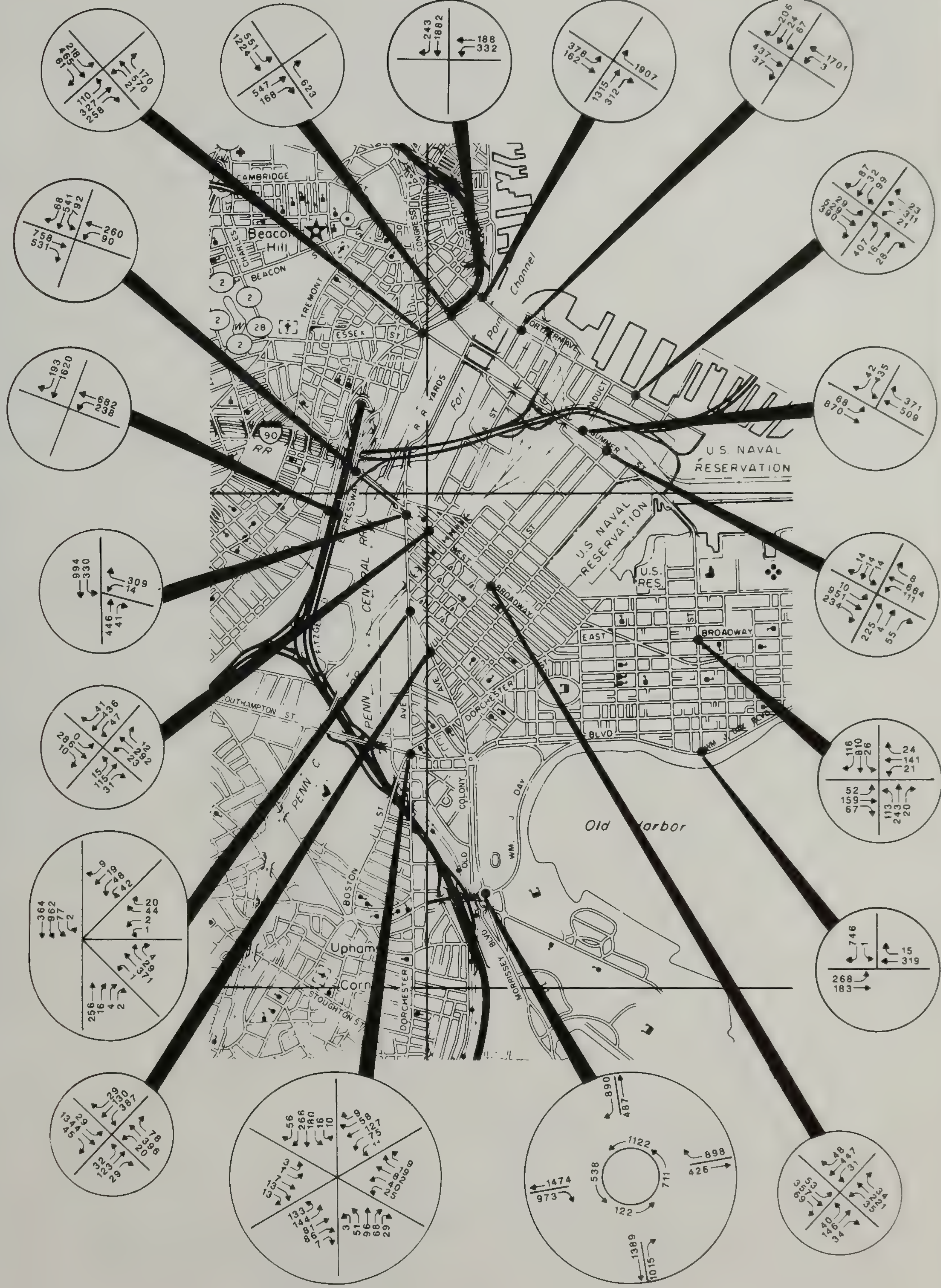


FIGURE
IV.1-18b
1995 PM
No-Build
Volumes With
Third Harbor
Tunnel

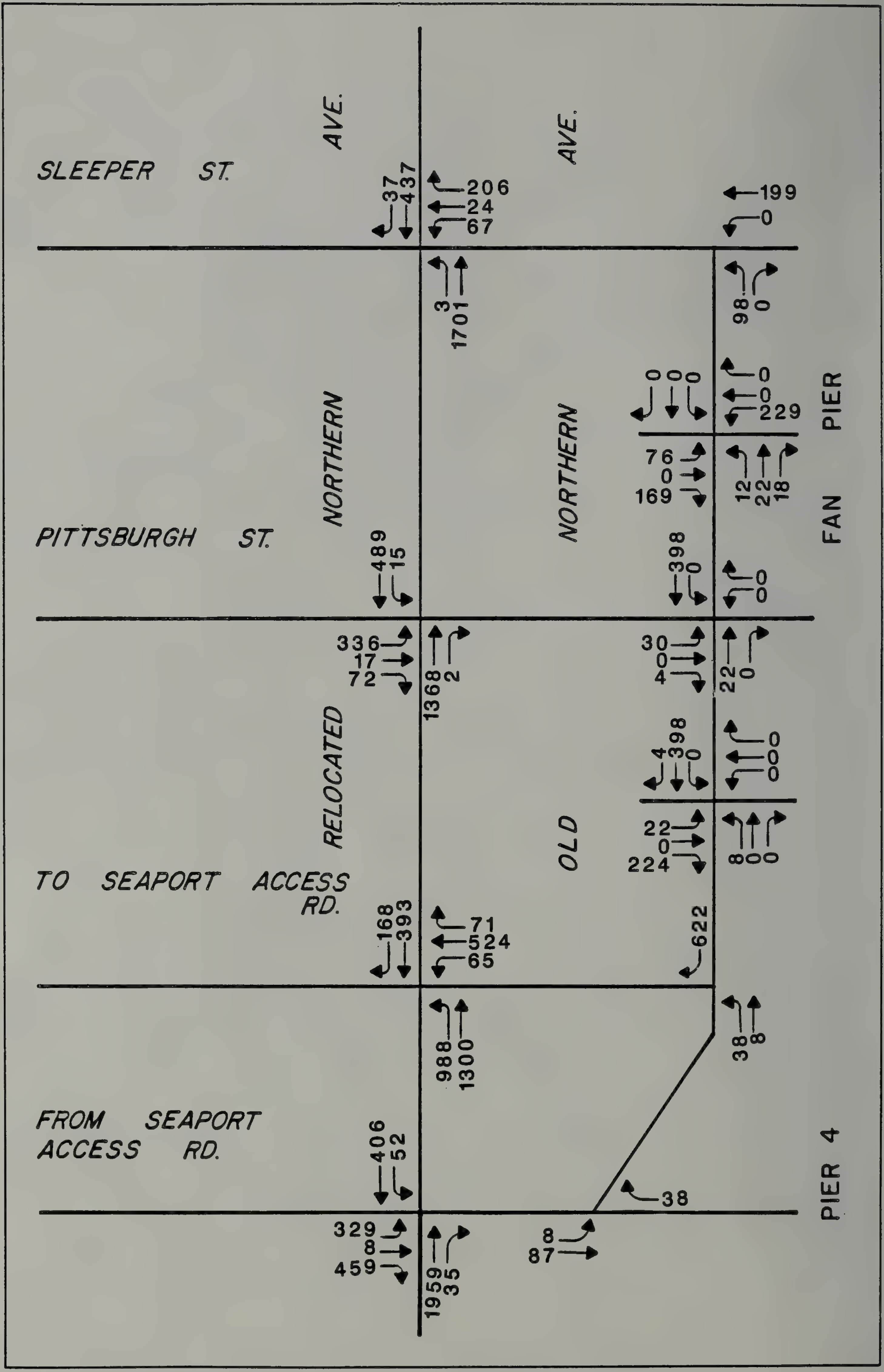


FIGURE
IV.1-19a
1995 AM Build
Volumes With
Third Harbor
Tunnel

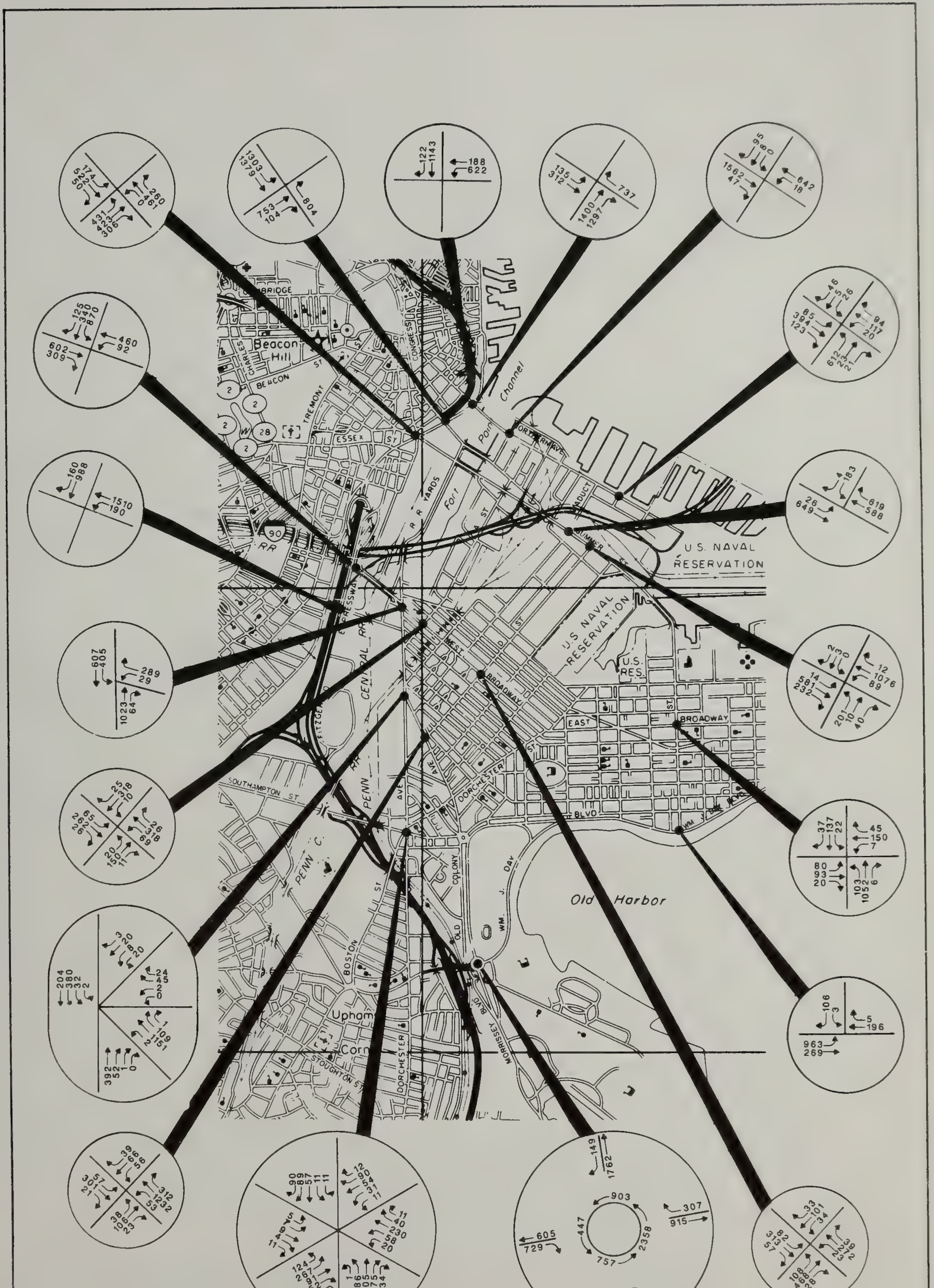


FIGURE
IV.1-19b
1995 AM Build
Volumes With
Third Harbor
Tunnel

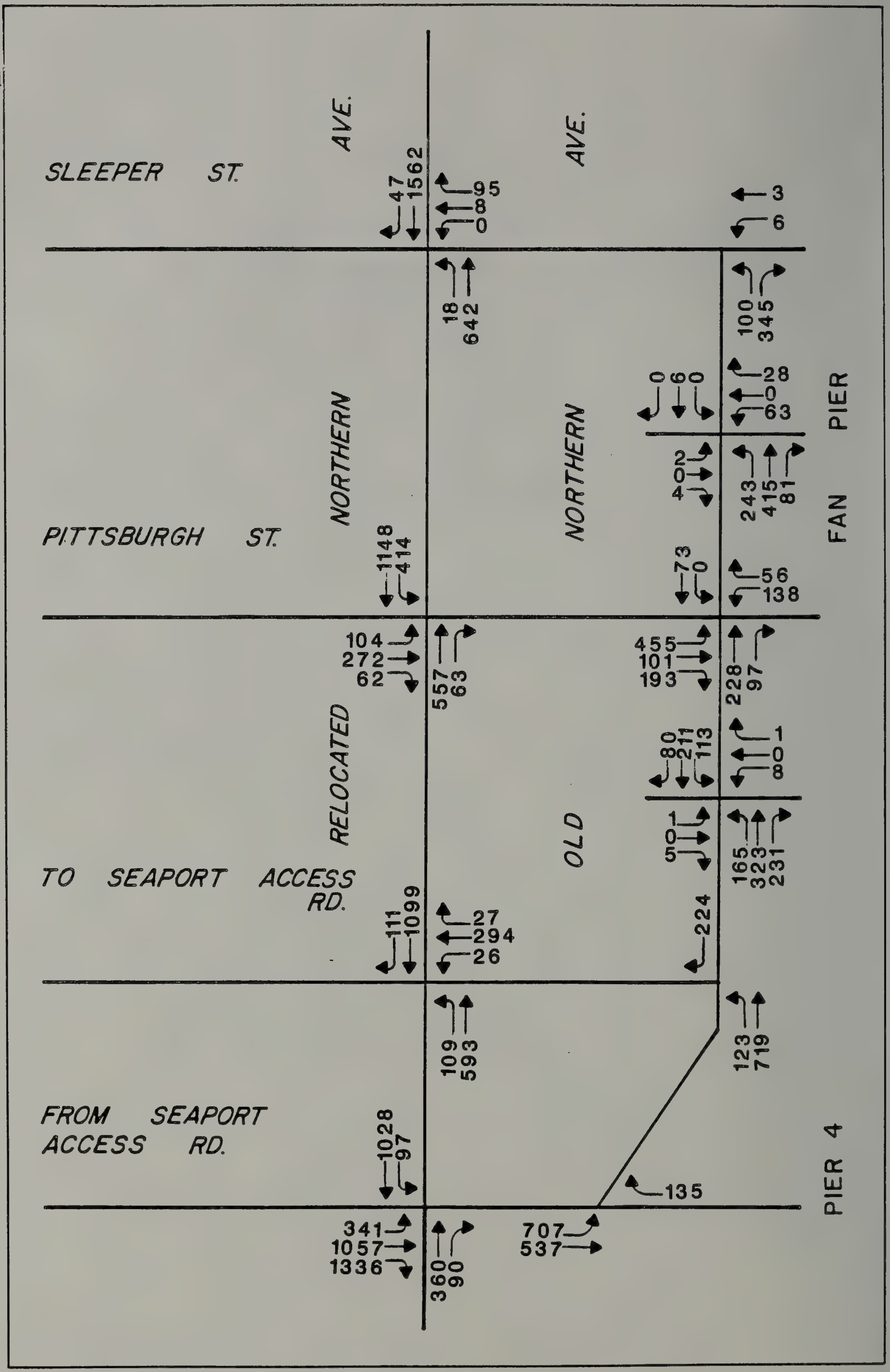


FIGURE
IV.1-20a
1995 PM Build
Volumes With
Third Harbor
Tunnel

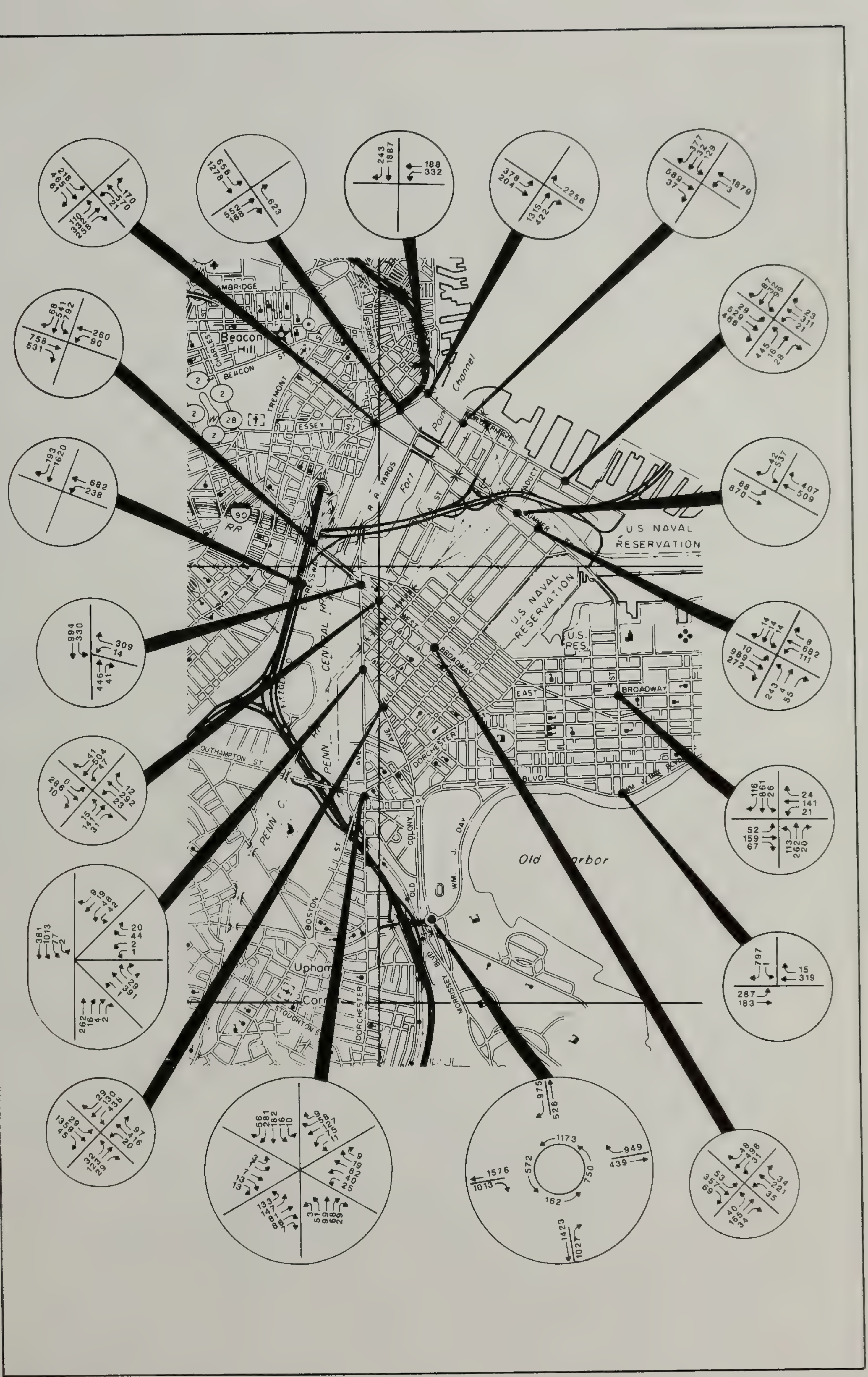
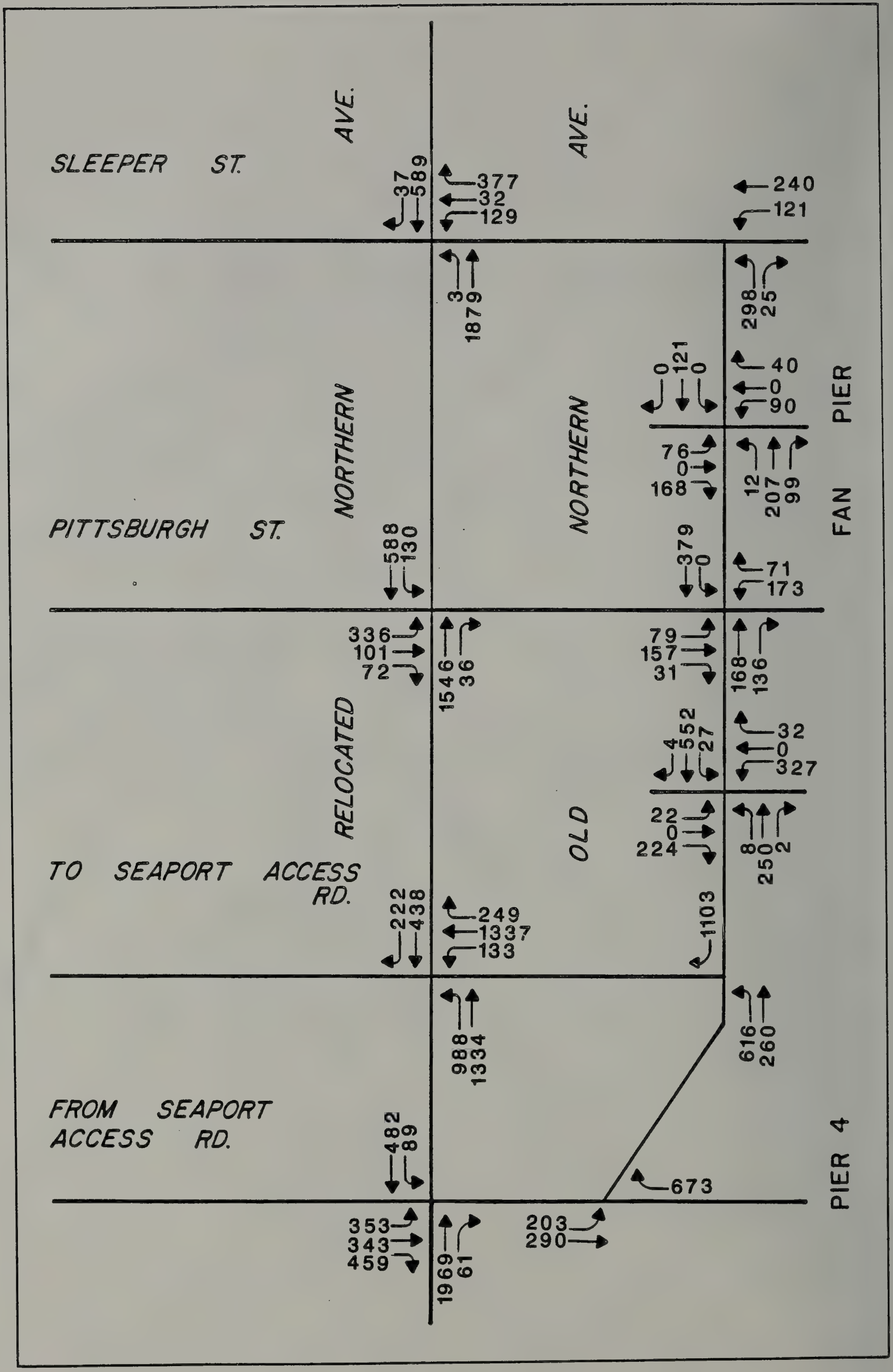


FIGURE
IV.1-20b
1995 PM Build
Volumes With
Third Harbor
Tunnel



Intersection Analysis

The following pages summarize the No-Build and Build intersection levels of service for the morning and evening peak hour for each of the analysis scenarios under parking constrained demand. The existing Levels of Service section presented earlier provides an explanation of the terms level of service, volume-to-capacity ratio, and available reserve capacity. The Traffic Appendix contains a detailed description of the traffic analysis procedure used to determine levels of service. In addition, the Traffic Appendix also shows comparative levels of service for several selected intersections with unconstrained and constrained project travel demands.

1990 Parking Constrained Demand. The results of the 1990 level of service analyses are summarized in Tables IV.1-23 and IV.1-24. In the morning peak hour, only four intersections will experience a decline in level of service from No-Build to Build conditions. However, all four will continue to operate at desirable levels of service ("C" or better). It should be noted that the intersection of New Northern Avenue and Pittsburg Street will experience a slight improvement in its volume-to-capacity ratio. This occurs because the new traffic from these sites, through this intersection, is more than completely offset by the loss of traffic from the closing of the Fan Pier parking lot.

In the evening peak hour seven intersections will experience a decline in level of service from the 1990 No-Build to Build case. Four of those intersections will continue to operate at Level of Service "D" or better. The intersections of Old Colony Avenue and D Street, Congress Street and Atlantic Avenue, and High Street and Atlantic Avenue will decline from Level of Service "E" to Level of Service "F". Two intersections along Atlantic Avenue at Northern Avenue and Summer Street will see a significant increase in volume-to-capacity ratio, even though both will operate at Level of Service "F" in the No-Build case as well as the Build case.

1995 Parking Constrained Demand without Third Harbor Tunnel. The results of the 1995 intersection level of service analyses are summarized in Tables IV.1-25 and IV.1-26. In the morning peak hour, without the addition of the Third Harbor Tunnel, 11 intersections will experience a change in level of service from the No-Build to Build case. Seven of the intersections will continue to operate at Level of Service "D" or better while the remainder will operate at Level of Service "E" or "F". Five additional intersections which will operate at Level of Service "F" in the No-Build will experience increases in volume-to-capacity ratios in the Build case. These intersections are Summer Street at Atlantic Avenue,

TABLE IV.1-23
Intersection
Analysis -
AM Peak Hour
for Existing
and 1990

	Existing		1990			
			No-Build		Build	
	V/C*	LOS**	V/C	LOS	V/C	LOS
East Broadway/L Street	0.53	A	0.58	A	0.62	B
West Broadway/D Street	0.64	B	0.71	C	0.76	C
Old Colony Avenue/D Street	0.67	B	0.76	C	0.82	D
West Broadway/A Street	0.65	B	0.65	B	0.68	B
West Fourth/Frontage Road	0.74	C	0.76	C	0.80	C
East Berkeley Street/Albany Street	0.76	C	0.76	C	0.76	C
Herald Street/Albany Street	0.55	A	0.55	A	0.55	A
Summer Street/Viaduct	0.53	A	0.61	B	0.66	B
Summer Street/Atlantic Avenue	0.93	E	1.03	E	1.03	E
Northern Avenue***/Atlantic Avenue	0.61	B	1.02	F	1.03	F
Congress Street/Atlantic Avenue	0.83	D	1.02	F	1.03	F
Broadway Bridge/Frontage Road	0.75	C	0.75	C	0.76	C
Summer Street/D Street	0.47	A	0.71	C	0.73	C
Andrew Square	0.71	B	0.85	D	0.86	D
High Street/Atlantic Avenue	0.75	C	0.94	E	0.96	E
Old Colony Avenue/Dorchester Avenue	0.57	A	0.59	A	0.61	B
Northern Avenue***/Ramp Street	149	D	0	E	0	E
Day Boulevard/L Street	352	B	25	E	0	E
Northern Avenue***/Sleeper Street	242	C	0.30	A	0.44	A
New Northern Avenue/Pittsburgh Street	N/A		0.88	D	0.86	D
New Northern Avenue/Seaport Access Road Entrance	N/A		0.38	A	0.49	A
New Northern Avenue/Seaport Access Road Exit	N/A		0.38	A	0.43	A
West Broadway/Dorchester Avenue	0.86	D	0.92	E	0.92	E
Old Northern Avenue/Farnsworth Street Ext.	N/A			A	771	A
Old Northern Avenue/Pittsburg Street	N/A			A	274	C
Old Northern Avenue/Stillings Street Ext.	N/A			A		A
Columbia Circle	1.03	F	1.32	F	1.46	F

* Volume-to-capacity ratio (available reserve capacity for unsignalized intersections)
** Level of Service
*** Old Northern Avenue for existing conditions, New Northern Avenue for future conditions

TABLE IV.1-24
Intersection
Analysis -
PM Peak Hour
for Existing
and 1990

			1990			
	Existing		No-Build		Build	
	V/C*	LOS**	V/C	LOS	V/C	LOS
East Broadway/L Street	0.49	A	0.55	A	0.58	A
West Broadway/D Street	0.67	B	0.82	D	0.87	D
Old Colony Avenue/D Street	0.82	D	0.94	E	1.03	F
West Broadway/A Street	0.59	A	0.71	C	0.75	C
West Fourth/Frontage Road	0.68	B	0.82	D	0.86	D
East Berkeley Street/Albany Street	0.64	B	0.67	B	0.70	B
Herald Street/Albany Street	0.69	B	0.69	B	0.69	B
Summer Street/Viaduct	0.46	A	0.61	B	0.72	C
Summer Street/Atlantic Avenue	0.94	E	1.03	F	1.10	F
Northern Avenue***/Atlantic Avenue	0.91	E	1.06	F	1.13	F
Congress Street/Atlantic Avenue	0.88	D	0.98	E	1.03	F
Broadway Bridge/Frontage Road	0.60	A	0.65	B	0.70	B
Summer Street/D Street	0.56	A	0.74	C	0.81	D
Andrew Square	0.52	A	0.74	C	0.75	C
High Street/Atlantic Avenue	0.90	D	1.00	E	1.04	F
Old Colony Avenue/Dorchester Avenue	0.44	A	0.45	A	0.48	A
Northern Avenue/Ramp Street	144	D	0	E	0	E
Day Boulevard/L Street	251	C	91	E	0	E
Northern Avenue***/Sleeper Street	0	E	0.74	C	0.87	D
New Northern Avenue/Pittsburgh Street	N/A		0.82	D	0.90	D
New Northern Avenue/Seaport Access Road Entrance	N/A		0.55	A	0.60	A
New Northern Avenue/Seaport Access Road Exit	N/A		0.48	A	0.57	B
West Broadway/Dorchester Avenue	0.70	B	0.88	D	0.88	D
Old Northern Avenue/Farnsworth Street Ext.	N/A			A	460	A
Old Northern Avenue/Pittsburgh Street	N/A		758	A	455	A
Old Northern Avenue/Stillings Street Ext.	N/A			A		A
Columbia Circle	1.05	F	1.10	F	1.20	F

* Volume-to-capacity ratio (available reserve capacity for unsignalized intersections)
** Level of Service
*** Old Northern Avenue for existing conditions, New Northern Avenue for future conditions

TABLE IV.1-25
Intersection
Analysis -
AM Peak Hour
for 1995 With
and Without
the Third
Harbor Tunnel

	1995 Without Third Harbor Tunnel				1995 With Third Harbor Tunnel			
	No-Build		Build		No-Build		Build	
Location	V/C*	LOS**	V/C	LOS	V/C	LOS	V/C	LOS
East Broadway/L Street	0.67	B	0.73	C	0.58	A	0.60	A
West Broadway/D Street	0.97	E	1.07	F	0.67	B	0.70	B
Old Colony Avenue/D Street	0.88	D	1.00	E	0.58	A	0.71	C
West Broadway/A Street	0.71	B	0.87	D	0.54	A	0.54	A
West Fourth/Frontage Road	0.82	D	0.86	D	N/A		N/A	
East Berkeley Street/Albany Street	0.80	C	0.81	D	0.80	C	0.80	C
Herald Street/Albany Street	0.58	A	0.58	A	0.65	B	0.65	B
Summer Street/Viaduct	0.93	E	0.95	E	0.52	A	0.54	A
Summer Street/Atlantic Avenue	1.14	F	1.22	F	0.97	E	0.98	E
Northern Avenue/Atlantic Avenue	1.01	F	1.26	F	0.87	D	0.97	E
Congress Street/Atlantic Avenue	1.19	F	1.31	F	1.05	F	1.15	F
Broadway Bridge/Frontage Road	0.79	C	0.80	C	N/A		N/A	
Summer Street/D Street	0.93	E	1.01	F	0.58	A	0.60	A
Andrew Square	0.77	C	0.88	D	0.75	C	0.76	C
High Street/Atlantic Avenue	1.05	F	1.09	F	0.48	A	0.49	A
Old Colony Avenue/Dorchester Avenue	0.64	B	0.69	B	0.56	A	0.58	A
Northern Avenue/Ramp Street	0	E	0	E	0	E	0	E
Day Boulevard/L Street	0	E	0	E	67	E	23	E
New Northern Avenue/Sleeper Street	0.49	A	0.63	B	0.38	A	0.45	A
New Northern Avenue/Pittsburgh Street	0.88	D	1.25	F	0.78	C	0.81	D
New Northern Avenue/Seaport Access Road Entrance	0.69	B	0.82	D	0.55	A	0.59	A
New Northern Avenue/Seaport Access Road Exit	0.62	B	0.66	B	0.95	E	1.18	F
West Broadway/Dorchester Avenue	0.90	D	0.90	D	0.75	C	0.75	C
Old Northern Avenue/Farnsworth Street Ext.	559	A	335	B	559	A	335	B
Old Northern Avenue/Pittsburg Street	208	C	213	C	208	C	213	C
Old Northern Avenue/Stillings Street Ext.	808	A	480	A	808	A	480	A
Columbia Circle	1.65	F	1.93	F	1.19	F	1.26	F

* Volume-to-capacity ratio (available reserve capacity for unsignalized intersections)
** Level of Service

TABLE IV.1-26
Intersection
Analysis -
PM Peak Hour
for 1995 With
and Without
the Third
Harbor Tunnel

Location	1995 Without Third Harbor Tunnel				1995 With Third Harbor Tunnel			
	No-Build		Build		No-Build		Build	
	V/C*	LOS**	V/C	LOS	V/C	LOS	V/C	LOS
East Broadway/L Street	0.62	B	0.69	B	0.54	A	0.55	A
West Broadway/D Street	1.01	F	1.10	F	0.68	B	0.70	B
Old Colony Avenue/D Street	1.13	F	1.29	F	0.86	D	0.91	E
West Broadway/A Street	0.85	C	1.01	F	0.57	A	0.59	A
West Fourth/Frontage Road	0.89	D	0.96	E	N/A		N/A	
East Berkeley Street/Albany Street	0.73	C	0.78	C	0.67	B	0.67	B
Herald Street/Albany Street	0.73	C	0.73	C	0.80	C	0.80	C
Summer Street/Viaduct	0.74	C	0.91	E	0.55	A	0.58	A
Summer Street/Atlantic Avenue	1.09	F	1.19	F	0.88	D	0.88	D
Northern Avenue/Atlantic Avenue	1.22	F	1.42	F	1.02	F	1.14	F
Congress Street/Atlantic Avenue	1.04	F	1.10	F	0.82	D	0.86	D
Broadway Bridge/Frontage Road	0.72	C	0.81	D	N/A		N/A	
Summer Street/D Street	0.91	E	1.07	E	0.61	B	0.64	B
Andrew Square	0.60	A	0.77	C	0.65	B	0.66	B
High Street/Atlantic Avenue	1.07	F	1.15	F	0.62	B	0.61	B
Old Colony Avenue/Dorchester Avenue	0.49	A	0.54	A	0.41	A	0.43	A
Northern Avenue/Ramp Street	0	E	0	E	0	E	0	E
Day Boulevard/L Street	0	E	0	E	125	D	74	E
New Northern Avenue/Sleeper Street	1.41	F	1.93	F	0.63	B	0.74	C
New Northern Avenue/Pittsburgh Street	1.14	F	1.41	F	0.89	D	1.00	E
New Northern Avenue/Seaport Access Road Entrance	0.81	D	0.94	E	0.99	E	1.18	F
New Northern Avenue/Seaport Access Road Exit	0.73	C	0.87	D	0.92	E	1.00	E
West Broadway/Dorchester Avenue	0.90	D	0.90	D	0.55	A	0.55	A
Old Northern Avenue/Farnsworth Street Ext.	651	A	371	B	629	A	526	A
Old Northern Avenue/Pittsburg Street	707	A	251	C	536	A	289	C
Old Northern Avenue/Stillings Street Ext.	696	A	278	C	545	A	371	B
Columbia Circle	1.18	F	1.29	F	0.98	F	1.02	F

* Volume-to-capacity ratio (available reserve capacity for unsignalized intersections)
** Level of Service

Northern Avenue at Atlantic Avenue, Congress Street at Atlantic Avenue, High Street at Atlantic Avenue, and Columbia Circle.

In the evening peak hour, 16 intersections will operate at Level of Service "E" or "F" under Build conditions. Four of those will represent declines from No-Build levels of service, while the remainder will operate at the same level of service. An additional six intersections will experience a decline in level of service, but will continue to operate at Level of Service "D" or better.

1995 Parking Constrained Demand with Third Harbor Tunnel. The results of the 1995 level of service analysis with the Third Harbor Tunnel are also summarized in Tables IV.1-25 and IV.1-26. In the morning peak hour, five intersections will experience a decline in level of service from the No-Build to Build case. Three of those intersections will operate at Level of Service "D" or better while the remainder would operate at Level of Service "E" or "F". The intersections of Atlantic Avenue at Congress Street and Columbia Circle would continue to operate at Level of Service "F" and experience an increase in volume-to-capacity ratio.

With the Third Harbor Tunnel, seven intersections will experience a decline in level of service from the No-Build to the Build case in the evening peak hour. Three of those intersections will operate at Level of Service "C" or better while four will operate at Level of Service "E".

Table IV.1-27 provides a summary of the number of intersections which will operate at Levels of Service "A" through "D" and Levels "E" or "F" for each of the scenarios. A summary is provided for both the morning and evening peak hours. The results demonstrate the importance of the Third Harbor Tunnel in reducing the number of deficient locations in 1995, including both Build and No-Build analysis conditions. The addition of the Third Harbor Tunnel to the 1995 Build network results in a decline in the number of intersections at Level of Service "E" or "F" in the morning peak hour from 13 to nine. In the evening peak hour, the number of deficient locations would decline from 16 to eight. The Mitigation section presented below identifies locations and specific mitigation measures which will address intersection deficiencies with the Third Harbor Tunnel. It also identifies additional mitigation measures which would be necessary if the Tunnel and Seaport Access Road are not constructed.

TABLE IV.1-27
Summary of Traffic Analysis Results

Analysis Condition	Number of Locations Analyzed	Number of Analysis Locations AM LOS A-D*	AM LOS E-F**	PM LOS A-D	PM LOS E-F
Existing	21	19	2	17	4
1990 No-Build	27	18	9	19	8
1990 Build	27	18	9	19	8
1995 No-Build w/o Tunnel	27	16	11	15	12
1995 Build w/o Tunnel	27	14	13	11	16
1995 No-Build with Tunnel	25	19	6	20	5
1995 Build with Tunnel	25	18	7	17	8

* Considered acceptable
** Considered deficient

Central Artery Analysis

The purpose of this section is to present the additional volumes that background and Fan Pier/Pier 4 development will contribute to critical Central Artery congestion points. The two congestion point locations presented are the High Level Bridge over the Charles River at the junction of I-93 and Route 1 and the Massachusetts Avenue interchange south of downtown. At both locations, existing congestion defines capacity. Currently, there are plans under way to replace the existing I-95/Route 1 interchange with a multi-level, fully directional interchange. This will result in increased capacity at this location and a reduction in the congestion that results from the limitations of the current interchange. However, even with the proposed improvements, this location will remain a limiting point in the overall capacity of the Central Artery.

Table IV.1-28 lists morning inbound volumes and evening outbound volumes approaching these locations in the peak hour. The morning approach volume to the High Level Bridge is the total of vehicles approaching from both I-93 and Route 1 (Tobin Bridge). Volumes for all three scenarios are included.

TABLE IV.1-28
Central Artery Peak Hour Volume Increases

Time/Location	1990	1995 Without Tunnel	1995 With Tunnel
Morning Inbound			
High Level Bridge			
Background	436	652	617
Fan Pier/Pier 4	227	418	385
Total	663	1,070	1,002
Massachusetts Avenue			
Background	1,867	1,927	2,662
Fan Pier/Pier 4	64	117	669
Total	1,931	2,044	3,331
Evening Outbound			
High Level Bridge			
Background	508	713	679
Fan Pier/Pier 4	254	464	428
Total	762	1,177	1,107
Massachusetts Avenue			
Background	1,723	1,781	2,477
Fan Pier/Pier 4	71	130	743
Total	1,794	1,911	3,220

In the morning, 1995 background and project approach volumes at Massachusetts Avenue without the Third Harbor Tunnel total just over 2,000. The volume approaching the High Level Bridge is 1,070. With the Third Harbor Tunnel, there is a small reduction in volumes at the bridge and a large increase at Massachusetts Avenue. The reduction at the bridge represents the shift of some Tobin Bridge traffic to the new tunnel. In contrast, the introduction of the Third Harbor Tunnel results in an increase of background and project volumes at the Massachusetts Avenue Interchange. This would occur because of the diversion of inbound trips from South Boston Streets such as A, D, and L to the Seaport Access Road. As a result, trips which would normally exit the Southeast Expressway at Morrissey Boulevard or Columbia Road would prefer to continue on the Expressway and the Central Artery until they reach the Massachusetts Turnpike interchange.

The diversion of trips to the Central Artery at Massachusetts Avenue is much more pronounced for project trips than background trips. This is because many of the background trips originate in downtown and therefore would use the Artery with or without the Third Harbor Tunnel. A considerable share of project trips is assigned to South Boston streets in the absence of the Tunnel. With the addition of the Seaport Access Road and the provision of direct connections to local roadways near the project, a large share of southbound traffic can be expected to use the Seaport Access Road for connection to the Southeast Expressway.

In the evening peak hour, diversions similar to those described for the morning peak hour would occur. At Massachusetts Avenue, outbound project and background traffic would increase from about 1,900 without the tunnel to more than 3,200 with the tunnel. At the High Level Bridge there would be a decline in project and background traffic.

The effect of the Third Harbor Crossing is to divert project and background traffic off the Artery north of Atlantic Avenue. In contrast, it would result in increased volumes along the Artery and Southeast Expressway from the Massachusetts Turnpike to Morrissey Boulevard. This additional volume represents the diversion of traffic from South Boston streets to the Seaport Access Road which would provide a direct connection to the Central Artery and Southeast Expressway. A bypass roadway along existing railroad right-of-way suggested in the Mitigation section would provide an alternate route that would divert project and background traffic from South Boston streets without adding it to the Central Artery at the Massachusetts Avenue interchange.

Table IV.1-29 provides a comparison of projected 1995 total volumes on the Central Artery with the projected increases from background development and the Fan Pier and Pier 4 developments. At the High Level Bridge, project volumes constitute no more than eight percent of total volume in 1995 under both scenarios with and without the Third Harbor Tunnel. Background volumes constitute a larger share at upwards of 13 percent.

At the Massachusetts Avenue interchange the project share of traffic is less than two percent of total traffic without the tunnel and less than nine percent with the tunnel. In contrast, background traffic is in excess of 20 percent of total traffic without the tunnel. With the tunnel the background share of total traffic approximates 28 percent.

TABLE IV.1-29
Central Artery
Volume Increases
and Total Traffic

	1995 Without Tunnel	1995 With Tunnel
Morning Inbound		
High Level Bridge		
Background	652	617
Fan Pier/Pier 4	418	385
All Traffic*	5,140	6,023
Massachusetts Ave.		
Background	1,927	2,662
Fan Pier/Pier 4	117	669
All Traffic*	8,898	9,365
Evening Outbound		
High Level Bridge		
Background	713	679
Fan Pier/Pier 4	464	428
All Traffic*	5,768	5,098
Massachusetts Ave.		
Background	1,781	2,477
Fan Pier/Pier 4	130	743
All Traffic*	8,410	8,778

* 1995 total traffic volumes are interpolated from 1990 and 2010 volumes given in the Supplement to the 1983 Draft Environmental Impact Statement for the Third Harbor Tunnel.

Roadway Deficiencies Summary

The intersection level of service analyses previously discussed provide a comparative basis for describing roadway conditions in the study area under varying volume conditions. In addition to these analyses, field observations have identified several locations throughout study area where driver mobility is hindered.

There are many elements of urban streets that have an impact on operating conditions, and not all of these elements are included in capacity analysis techniques. For example, illegal parking and suboptimal signal timing. Therefore, additional information developed for area roadways during travel time runs and physical inventories are noted in the subsequent paragraphs. The listing of these data provides a summary of observed operating conditions that lead to identification of potential problem areas as well as mitigation measures. These observations are summarized separately for the morning and evening peak hours.

In the morning peak hour, the following factors have been identified as reducing traffic flow and restricting mobility:

- Narrow lanes, curb parking, and pedestrian crossings along L Street;
- Auto/truck conflicts along D Street;
- Inefficient signal timing and auto/truck conflicts along A Street;
- Heavy right turn volume from Broadway Bridge to Frontage Road confined to single lane;
- Short weave distance between Central Artery off-ramp and Northern Avenue along Atlantic Avenue. New Northern Avenue Bridge alignment will eliminate this difficulty;
- Heavy volumes creating congestion at bottlenecks on the Central Artery between the Massachusetts Avenue and Massachusetts Turnpike interchanges, and at high the level bridge over the Charles River. The latter problem will be partially ameliorated by the construction of new ramps and interchange at I-93 and U.S. 1; and
- Heavy pedestrian activity at several intersections particularly at Summer Street and Atlantic Avenue.

The following summarizes major system deficiencies in the evening peak hour:

- Narrow lanes, curb parking, and pedestrian crossings along L Street.
- Inefficient signal timing and on-street parking along Old Colony Avenue.
- Inefficient signal timing and auto/truck conflicts along A Street.
- Narrow travel lanes and short storage lanes combined with heavy volumes along Broadway under the Central Artery.
- Uncontrolled intersection and two heavy converging traffic streams at Northern Avenue and Atlantic Avenue. This intersection will be signalized with the realignment of Northern Avenue, but heavy volumes will still result in congestion and delays.

- Heavy volumes and congestion on the Central Artery between the Massachusetts Avenue and the Massachusetts Turnpike interchanges, and at the high level bridge over Charles River.

- Heavy pedestrian activity at several intersections including Atlantic Avenue at Summer Street and Atlantic Avenue at Northern Avenue.

The above observations generally summarize major problems in the study area roadway system. The intersection level of service analyses provide a more quantitative indication of problems at specific intersection locations. Measures to mitigate the potential impact of development on these problem areas will address both general traffic management problems as well as specific roadway capacity problems to the extent feasible.

■ Parking Impacts

Loss of Existing Commuter Parking

The proposed development of the Fan Pier will result in the elimination of the current surface parking lot used by daily commuters. As a result, it will be necessary for these commuters to locate alternative parking or use other means of travel. Analysis of the parking situation in Boston indicates that no comparably-priced parking alternatives are likely to be available and that these commuters will have to use public transportation or rideshare with other commuters who have a downtown parking space.

A recent EIR prepared for a major downtown development[1] projected a deficit of 1,625 parking spaces in downtown Boston under 1990 Build conditions. This projection included the elimination of the 2,000 spaces from the Fan Pier and assumed construction of 2,250 new public spaces at South Station, reconstruction and expansion of the Post Office Square Garage to add 500 spaces, and the new availability of 250 existing spaces because of shifts to new parking at North Station. In addition, the City of Boston completed a parking study showing parking demands in the Financial District and South Station area will exceed available supply by 7,964 spaces in 1990.[2] Based on this projected deficit, there would be no space available for the 1,125 vehicles currently parking on the Fan Pier.

If the 1990 projected 1,625-space deficit in downtown were to be eliminated by increased ridesharing, the average work-trip vehicle occupancy rate (VOR) would have to increase by 14 percent. Such an increase is highly unlikely considering the downward trend in the overall VOR reported in the 1982 Cordon Count. According to that study, the overall average VOR had dropped from 1.57 in 1972 to 1.42 in 1982. It was also estimated that if only one-third of the parking shortfall was made up by a shift to ridesharing, the average work trip VOR would still need to increase by 5 percent.

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[1] International Place

[2] Parking in Central Boston, 1983

Those drivers who do not rideshare with other downtown parkers would have to shift to public transportation. Table IV.1-30 shows the expected changes in VOR associated with different levels of shifts to ridesharing. The range runs from a 100 percent shift to rideshare (no impact on traffic or transit) to no shift (worst case for transit). The projected shifts in VOR are based on the International Place analysis described previously.

TABLE IV.1-30
Shift of Current Fan Pier Parkers to Transit and Ridesharing

Percent of Downtown Displaced Parkers Shifting to Ridesharing	Percent Increase in Downtown VOR*	Additional Transit Trips** from Current Fan Pier Parkers		
		Daily	AM Peak	PM Peak
100%	14%	0	0	0
50%	7%	1,700	385	345
33%	5%	2,266	514	460
0%	0%	3,398	767	690

* VOR - vehicle occupancy rate. Percent increases taken from International Place EIR.

** Based on an assumed VOR of 1.51 multiplied by the current trips to and from the parking lot.

The Table also estimates transit trips from the shifts of Fan Pier parkers assuming a VOR of 1.51 for vehicles currently parking on the Fan Pier. This rate was used for work trips in the 1983 report "Parking in Central Boston," and is based on the overall average VOR of 1.42 from the 1982 Cordon Count. In the worst case, all current Fan Pier parkers would shift to transit. As a result, an estimated 3,400 trips daily would be added to the various public transportation services. In the morning peak hour, there would be almost 770 new transit trips and in the evening peak hour, there would be approximately 690 new transit trips. As a worst case, the impact of these trips on the transit system is analyzed in the Public Transportation section.

Project Parking Demand for Fan Pier and Pier 4

The number of parking spaces required by the office and retail uses was estimated from the unconstrained vehicle-trip generation projections for the project. Parking requirements are divided into long-term employee parking and short-term business/shopping parking. Turnover rates of 1.0 for long-term (work-related) parkers and 2.67 for short-term (non-work related) parkers were assumed (Source: Parking in Central Boston, 1983 - Boston Traffic and Parking Department).

A total of over 1,600 spaces will be needed to satisfy the projected demand of the project's office and retail uses in the Initial Build. At Full Build, the demand for parking spaces would increase to over 4,600. Approximately 3,600 spaces would be required for long-term parkers with another 1,000 needed for short-term parkers.

Parking Supply at Fan Pier/Pier 4

The proposed supply of parking spaces on Fan Pier and Pier 4 is shown in Table IV.1-31. A total of 2,240 spaces will be provided for the Initial Build and 4,700 for the Full Build. At Full Build, 1,100 of the total spaces will be reserved for use by residents and another 700 will be reserved for use by hotel patrons. The remaining 2,900 spaces will be available to the office and retail uses. It should be noted that during the daytime peak, up to 360 of the office and retail spaces on Pier 4 will be used by Anthony's Pier 4 customers, leaving a total of 2,540 spaces for the new office and retail uses. In the Initial Build, a net total of 900 spaces on both sites will be

TABLE IV.1-31
Parking Supply

Phase	Office/ Retail	Hotel	Residential	Total
1990 Initial Build				
Fan Pier	420*	450	230	1,100
Pier 4	840**	125	175	1,140
Total	1,260	575	405	2,240
1995 Full Build				
Fan Pier	1,500*	450	550	2,500
Pier 4	1,400**	250	550	2,200
Total	2,900	700	1,100	4,700

* Based on tandem parking.
** Includes 360 spaces used by existing Anthony's Pier 4 Restaurant during daytime period.

available for these new uses. The proposed number of spaces per 1,000 square feet greatly exceeds that generally provided by downtown developments.

Parking Supply/Demand Summary

The relationship of projected parking demand to proposed parking supply is summarized in Table IV.1-32. For the Initial Build, office and retail uses will generate a demand for 1,625 spaces. The proposed supply of 900 spaces will result in a deficit of 725 spaces. At Full Build, a total of almost 2,540 spaces will be provided to meet a projected demand of almost 4,650 spaces for office and retail users. The result is a project shortfall of approximately 2,100 spaces.

TABLE IV.1-32
Parking Supply/Demand Summary for Office and Retail Uses

Phase	Demand	Supply	Surplus/ (Shortfall)
1990 Initial Build			
Fan Pier	1,054	420	(634)
Pier 4	571	480*	(91)
Total	1,625	900	(725)
1995 Full Build			
Fan Pier	3,047	1,500	(1,547)
Pier 4	1,602	1,040*	(562)
Total	4,649	2,540	(2,109)

* Does not include 360 spaces used by Anthony's Pier 4 Restaurant.

A projected shortfall in parking may be addressed by increasing supply, decreasing demand, or by a combination of the two. If the parking supply cannot be increased, demand would have to be reduced by increased vehicle occupancy rates or increased shares of transit and walking modes. The greatest demand for public transportation would result from shifting the shortfall entirely to mass transit and is used in the analysis of impacts on public transportation.

Eliminating the projected parking shortfall by a shift to transit would require a substantial increase in the transit share of trips. At Full Build, the transit share of office work trips would then increase from an average of 30 percent to 50 to 60 percent. By way of comparison, the 1983 Boston Parking Study assumed that transit travel accounts for 65 percent of all office work trips in the Boston financial district. Non-work trips would need to rise from an average 20 percent to 30 to 45 percent.

Such a shift to transit would reduce daily project vehicle-trips to 18,456 from 24,154 while increasing daily transit riders from 17,798 to 27,421. Table IV.1-16 under Fan Pier/Pier 4 Travel Demands shows project vehicle-trip generation with demand constrained by the available parking supply. The public transportation impact analysis which follows is based on this parking constrained vehicle-trip generation.

The development of the Fan Pier and Pier 4 will result in the loss of an existing parking lot on the Fan Pier serving approximately 1,100 vehicles daily. It will also result in the demand for over 4,600 spaces to serve the new office and retail uses. A total of 2,240 spaces are proposed to serve these uses. Although the number of parking spaces per 1,000 square feet would exceed that generally provided downtown, it would not be sufficient to satisfy an unrestrained demand from the development. In reality, vehicular travel demand can be expected to be at a level consistent with parking availability.

The analysis of traffic impacts is based on projected traffic volumes which can be accommodated by the proposed parking supply. All excess unconstrained demand was assumed to use public transportation and is included in the project transit demands in the transit analysis. Although some of the excess demand may be accommodated by increased ridesharing, it was decided to assume a worst case condition for the transit analysis. In similar fashion, all of the current Fan Pier parkers were also assumed to shift to transit and are included in the transit analysis.

■ Public Transportation Impacts

Transit Trip Generation

Based on the trip generation assumptions referenced previously and the parking analysis described above, the proposed development will generate approximately 27,420 transit trips daily under parking constrained conditions at Full Build. As shown in Table IV.1-33, approximately 4,050 transit trips would occur in the morning peak hour and more than 4,600 trips would occur in the evening peak hour. These peak hour volumes represent 14.7 percent and 16.9 percent, respectively, of total daily transit trips.

The transit analysis which follows was restricted to 1995 demands which represent a worst case condition for the transit system. This is because a number of system improvements currently planned by the MBTA, including new equipment, longer trains, and improved track, will come on line before 1990. Thus, the Initial Build will occur shortly after significant improvements in transit capacity. Therefore, future demands are well within

TABLE IV.1-33
1995 Parking Constrained Transit Trip Generation

	Fan Pier	Pier 4	Project Total	Current Fan Pier Parkers*	Total
Daily	18,955	8,466	27,421	3,398	30,819
AM Peak					
In	2,735	868	3,603	767	4,370
Out	283	163	446	0	446
Total	3,018	1,031	4,049	767	4,816
PM Peak					
In	454	271	725	27	752
Out	2,895	1,023	3,918	663	4,581
Total	3,349	1,294	4,643	690	5,333

* Worst case scenario based on all parkers currently using Fan Pier shifting to transit.

system operating capacity. Demand on the system will be highest in 1995 with Full build of the proposed project and the completion of all the background development described earlier.

In addition to the transit trips generated by the new construction on the site, the proposed projects will also create additional transit demand by displacing the commuters who currently park at the Fan Pier. As discussed previously, these displaced parkers will likely be unable to find comparably priced alternative parking. As a result, they are expected to use transit or carpool with others. In the worst case transit scenario, they would all use transit and add another 3,400 trips daily on the public transit system. When the displaced parkers are combined with the transit trips generated by Fan Pier/ Pier 4, the result is a total of more than 4,800 new transit trips in the morning peak hour and more than 5,300 transit trips in the evening peak hour.

Other development activity will also generate new demands for transit service. Based on the trip generation assumptions and background developments described earlier, other developments in downtown and South Boston are expected to generate approximately 15,000 inbound transit trips in the morning peak hour and almost 15,300 outbound trips in the evening peak hour. More than 90 percent of these background trips will be generated by development in downtown.

This projection of background transit trips is limited to those developments listed in the Traffic Appendix. Additional background trips from other sources can also be expected. These include: through trips to new developments outside of downtown; additional shifts to transit because of the projected parking deficits in downtown; and additional downtown development between 1990 and 1995. An additional five percent increase in ridership was projected for each line to account for these factors. This increase was based on the 1972 to 1982 increase in transit passengers of 5.8 percent from the 1982 Cordon Count and a 2.8 percent increase in downtown employment between 1985 and 1995 projected by the Metropolitan Area Planning Council.

Transit Trip Assignment

The assignment of transit trips to the various transit modes and lines was based on the 1982 Cordon Count for downtown Boston, 1980 Census journey-to-work data for South Boston, and existing rapid transit usage. As shown in Table IV.1-34, the 1982 Cordon Count indicates that 70 percent of transit crossings into downtown were by rapid transit, 23 percent were by bus and seven percent were by commuter rail. In comparison to 1972 counts, rapid transit and streetcar usage declined by more than 12 percent, while bus had increased by almost 21 percent and rail ridership increased by 157 percent. Total transit usage was up by almost six percent. The 1980 Census data for South Boston indicate a larger share of bus trips and

TABLE IV.1-34
Distribution of Transit Trips by Mode

Mode	Line	1982 Cordon Count (downtown)	1980 Census (South Boston)*
Bus	Local	N/A	33%**
	Commuter	N/A	7%
	Total	23%	40%
Rapid Transit	Red	N/A	22%
	Orange	N/A	15%
	Green	17%***	10%
	Blue	N/A	7%
	Total	70%	54%
Commuter Rail	North	N/A	1%
	South	N/A	5%
	Total	7%	6%
Total		100%	100%

* Journey-to-work data for census tracts 606 and 614 which generally include areas of South Boston north of the Reserved Channel and Summer Street and west of D Street south to Dorchester Avenue.

** Distribution by line estimated from geographic distribution by city and town.

*** Percent distribution by "streetcar".

a smaller share of rapid transit trips than observed in downtown. This reflects the greater accessibility to buses than to rapid transit lines.

The 1982 Cordon Count distribution was used to assign trips to the major transit modes for project trips and all background trips except those from South Boston east of the proposed project which were assigned based on the distribution from the 1980 Census data. This approach was selected based on two assumptions. The first was that recently completed and proposed rapid transit improvements will halt the earlier decline in ridership and will result in a stabilization of the current share of transit trips using rapid transit in downtown. The second assumption was that given their proximity to downtown, the proposed projects and adjacent background development would more likely have a transit mode use pattern similar to downtown than to that reported for the South Boston tracts in the 1980 census. Table IV.1-35 shows the assignment of Fan Pier/Pier 4 and background peak hour trips to major transit modes.

TABLE IV.1-35
New Peak Hour
Transit Trips
by Transit Mode

	Fan Pier/Pier 4**		Background***		Total	
Mode*	AM In	PM Out	AM In	PM Out	AM In	PM Out
Bus	1,005	1,053	3,577	3,643	4,582	4,697
Rapid Transit	3,059	3,207	10,337	10,553	13,396	13,759
Commuter Rail	306	321	1,039	1,061	1,345	1,382
	4,370	4,581	14,953	15,257	19,323	19,838

* No commuter boat assignment is made because current usage is not a significant share of total transit. See mitigation section for further discussion of potential impact of commuter boats.

** Includes current users of Fan Pier parking lot.

*** Based on background developments listed in the Traffic Appendix.

The transit analysis concentrated on the rapid transit system because its capacity will be relatively fixed and because it carries such a large share of total transit trips. As previously described, each rapid transit line can only accommodate a fixed number of cars per train. In addition, peak hour frequencies have a maximum limit. In contrast, the commuter rail system can be expanded by the addition of cars to existing trains or by the scheduling of additional trains. The capacity of the bus system can be even more easily expanded by operating additional vehicles.

The most convenient access to rapid transit from the proposed developments will be to the Red Line at South Station and the Blue Line at Aquarium. The Red Line is the most heavily used rapid transit line based on MBTA ridership figures. It also provides convenient access to the Orange Line at Washington and the Green Line at Park Street. These stations are the first outbound stops to Cambridge after South Station. The Blue Line also provides transfers to the Orange Line at State Street and to the Green Line at Government Center.

Rapid transit trips were assigned to the various lines based on the distributions shown in Table IV.1-36. Fan Pier and Pier 4 trips and South Boston background trips were assigned using the distribution based on the census data for South Boston. The assignment of downtown background trips and current Fan Pier parkers was based on existing line ridership. The Traffic Appendix details these calculations.

Rapid Transit Analysis

The heaviest transit impact of the proposed development will be on the Red Line south of downtown. As shown in Table IV.1-37, the Fan Pier and Pier 4 developments are expected to add approximately 800 inbound transit trips in the morning peak hour. In the evening, almost 850 outbound trips are expected. These projected volumes include transit trips made by the current users of the Fan Pier parking lot. Background developments will have an even greater impact, generating approximately 2,400 inbound trips in the morning and 2,450 outbound trips in the evening. Expected new trips for the Red Line North and the Blue Line North, as well as for all other rapid transit lines, are also shown in Table IV.1-37.

Because of the closer accessibility of the Red Line to the sites, Fan Pier and Pier 4 Orange and Green Line trips are expected to be made via transfer to and from the Red Line. Orange Line transfers will be made at Washington Station and Green Line transfers will be made at Park Street Station. Therefore, the peak project load on the rapid transit system will be on the Red Line between South Station and Washington. This segment will carry not only Red Line North trips, but also all Green and Orange Line trips. As a result, Fan Pier and Pier 4 can be expected to generate almost 1,900 morning inbound trips and 1,975 evening outbound trips on that segment of the Red Line.

TABLE IV.1-36
Assignment of New Rapid Transit Trips by Line

Line/Direction	Fan Pier, Pier 4 and South Boston Background Trips*	Downtown Background Trips and Current Fan Pier Parkers**
Red/North	14%	12%
Red/South	27%	23%
Blue/North***	12%	12%
Orange/North	17%	20%
Orange/South	11%	14%
Green/West	16%	17%
Green/East	3%	2%
	100%	100%

* Based on 1980 Census journey-to-work data.

** Based on existing rapid transit ridership.

*** No assignment is made for the Blue Line to Bowdoin as it would principally accommodate transfers to other lines.

TABLE IV.1-37
New Peak Hour Rapid Transit Trips by Line

Line/	Fan Pier/Pier 4*		Background**		Total	
Direction	AM	PM	AM	PM	AM	PM
Red/North	417	440	1,256	1,282	1,673	1,722
Red/South	804	847	2,407	2,456	3,211	3,303
Blue/North	367	385	1,240	1,267	1,607	1,652
Orange/North	536	559	2,045	2,088	2,581	2,647
Orange/South	353	367	1,425	1,455	1,778	1,822
Green/West	495	518	1,749	1,787	2,244	2,305
Green/East	87	91	215	218	302	309
Total All Lines	3,059	3,207	10,337	10,553	13,396	13,760

* Includes current users of Fan Pier parking lot.

** Based on background developments listed in the Traffic Appendix.

Because most downtown background developments have direct accessibility to all lines, only One Financial Center was assumed to add transit trips through South Station for access to other lines. In addition, only Red Line North trips from developments located closer to South Station than Washington Street were loaded at South Station. All South Boston development transit trips were assumed to access the various lines in the same fashion as the proposed projects (i.e., Orange and Green Lines via South Station). The total loading on the South Station to

Washington segment of the Red Line is shown in Table IV.1-38.

TABLE IV.1-38
Transit Trips Loading at South Station Northbound

Line/	Project		Background		Total	
Direction	AM	PM	AM	PM	AM	PM
Red/North	417	440	677	691	1,094	1,131
Orange/North	536	559	385	387	921	946
Orange/South	353	367	263	264	616	631
Green/West	495	518	339	341	834	859
Green/East	87	91	49	48	136	139
Total	1,888	1,975	1,713	1,731	3,601	3,706

The projected volumes shown in Table IV.1-39 indicate that when both background development and the Fan Pier and Pier 4 projects are built the Red Line will operate well under normal capacity north to Cambridge and south to Dorchester and Braintree. The segment of the Red Line between South Station and Washington Street which would carry Red Line North trips as well as Orange and Green Line trips would also operate well under capacity. The Blue Line north to Wonderland will operate over normal capacity but under crush capacity based on existing headways. On most of the lines, approximately five percent of projected line volumes would be project induced trips although on the Red Line between South Station and Washington, the Build volume represents a 13 percent increase over the No Build volume. In general, background development would generate about a 20 to 25 percent increase over existing volumes.

The projection of Red Line conditions is based on the assumption that, with the expansion of trains to six cars, headways would remain the same as at present. However, MBTA officials indicate that no decision on scheduling six-car trains has been made and that consideration will be given to increasing the time between trains. If headways on each of the Red Line runs were to increase to 10 minutes from the current 8.5 minutes, projected capacity on each run would decline from 8,976 to 7,854. This lower capacity would still be 30 percent higher than existing capacity. Table IV.1-40 compares the projected volumes along the Red Line with projected capacities based on 8.5- and 10-minute headways. Even with the lower capacity which would result from increased headways, 1995 Build volumes are within projected normal capacity.

TABLE IV.1-39
Projected Peak Hour Transit Volumes and Capacities

		Peak Hour Ridership					
		1995 No-Build+		1995 Build		1995 Line Capacity++	
Line/ Direction	Existing	Volume	Percent Increase	Volume	Percent Increase	Normal	Crush
Red Line/North							
Alewife-Ashmont Braintree-Davis	7,300*	8,947	22.6%	9,387	4.9%	17,952	23,424
Red Line/South							
Alewife-Ashmont Braintree-Davis Quincy-Park	12,120	15,182	25.3%	16,029	5.6%	26,928	35,136
Red Line/South Station-Washington							
Alewife-Ashmont Braintree-Davis Quincy-Park	12,120**	14,457	19.3%	16,432	13.7%	26,928	35,136
Blue Line/North							
Bowdoin-Wonderland	6,120	7,693	25.7%	8,078	5.0%	7,040	8,896

+ Includes background developments listed in the Traffic Appendix.

++ Projected Red Line capacity is 50 percent greater than existing capacity to account for MBTA plans to lengthen trains from four to six cars. This assumes that current headways are maintained.

* 1985 ridership estimate based on 1984 ridership at Charles station and 1985 peak period turnstile counts for Cambridge stations, including extension to Alewife.

** Ridership figures not available for South Station to Washington segment, therefore, peak ridership for Andrew Station is used to present "worst case" condition, i.e., peak project impact added to peak base volume.

TABLE IV.1-40
Projected Red Line
Capacity with
Longer Headways

Line/Segment	1995 Build Volumes	Normal Capacity @ 8.5 Minute Headways*	Normal Capacity @ 10 Minute Headways*
Red/North			
Alewife-Ashmont Braintree-Davis	9,387	17,952	15,708
Red/South			
Alewife-Ashmont Braintree-Davis Quincy-Park	16,029	26,928	23,562
Red/South Station-Washington			
Alewife-Davis Quincy-Park	16,432	26,928	23,562

* Headways are for each of the three runs. Headways for any particular station are based on the number of runs which go through the station.

Although this analysis has concentrated on the two lines directly accessible to the site, the line volumes shown earlier indicate impacts on the Orange and Green Lines. Presently, construction is underway on the relocation of the Orange Line south of downtown. In addition, MBTA officials expect to begin lengthening platforms at all downtown Orange Line stations by mid-1986. Completion of these efforts will allow operation of six-car trains, resulting in a substantial increase in capacity should operating headways remain the same.

The relocated Orange Line will be nearer to the Green Line than at present and will have a station in the Back Bay on Dartmouth Street between Stuart Street and Columbus Avenue. As a result of the new alignment and increased capacity, a significant diversion of riders from the Green Line to the Orange Line is expected. This diversion, combined with the planned acquisition of 50 new Light Rail Vehicles for the Green Line, will result in greatly improved levels of service on the Green Line.

The projected rapid transit trips generated by the development of the Fan Pier and Pier 4 can be accommodated on the Red Line because of planned improvements, including new vehicles, improved track and signals, and refurbished stations which can accommodate longer trains. The Red Line was analyzed at the peak load points on the line at Charles and Andrews station and between South Station and Washington where peak project loading would occur. The Blue Line is projected to operate over normal capacity but under crush capacity. The addition of a few extra trains in the peak hour could provide the needed additional capacity. Planned improvements on the Orange and Green lines will provide additional capability to meet project demands.

The projection of Fan Pier and Pier 4 transit trips was based on the parking constrained traffic generation and includes transit trips generated by the current users of the Fan Pier parking lot. Transit trips from other developments included all downtown and South Boston background developments identified for the traffic analysis and also included a generalized growth factor to account for through trips and other potential development by 1995.

■ Construction Impacts

Scheduling

Because the Fan Pier and Pier 4 projects will be constructed separately, there will be a complementary effect between the two in terms of timing and construction impacts. With Phase I of Fan Pier scheduled to start in late 1986, the initial peak truck volumes and peak manpower loading on Fan Pier will have passed as construction on Pier 4 commences. Also, Pier 4 impacts will be less than for the Fan Pier due to the smaller scale of the development. Presently, no roadway closures are anticipated as a result of construction.

Truck Movements During Construction

Trucks will be needed to remove material excavated from the site and to deliver construction goods to the site. Truck traffic will vary considerably throughout the construction period, but peak truck activity will occur during the excavation periods.

Fan Pier is expected to generate approximately 130 truck trips per day during the excavation period which is scheduled to last seven months. Subsequently, 40 truck trips per day are projected through the end of 1988 for delivery of facade panels, structural steel and sheetrock. Truck trips would be reduced to 20 trips per day starting in 1989.

A maximum of 130 truck trips per day on Fan Pier translates to approximately 16 trucks per hour if distributed evenly over an eight-hour day. Based on information available, trucks coming to and from the site would use major arterial roadways and would not use local South Boston streets. Excavate will probably be transported to sites in Lynn and Quincy. Trucks going to the north would travel across the Congress Street Bridge to the Central Artery and then north either on I-93 or Route 1. Trucks going south would use the Central Artery to the Southeast Expressway. Trucks carrying fill materials into the site would travel via the Southeast Expressway to the Congress

Street Bridge. When more detailed information is available on trip origin and destination, it may be desirable to outline specific routes for truck use.

Due to the fact that the existing Northern Avenue Bridge has a low load rating, most trucks carrying fill, concrete and reinforcing steel will probably use the Congress Street Bridge. Construction on a new Northern Avenue Bridge is due to start in early 1987 and take one and one-half years to complete. Once in place, the New Northern Avenue bridge could carry load-bearing trucks for later phases of construction.

Construction Employee Trip Generation

Trip generation by construction workers is a direct function of employment levels. Manpower loading will reach a peak in late 1989 on the Fan Pier construction with approximately 650-700 workers employed at that time. The volume of traffic generated by the construction workers should not have any serious impact since the closing of the existing Fan Pier parking lot to commuters would have an offsetting effect in terms of the number of vehicle-trips per day.

Peak hour counts taken in June, 1985 indicate that over 500 vehicles entered the existing Fan Pier site in the morning peak hour and almost 440 vehicles exited in the evening peak hour. Construction worker peak hour trips would not be significantly higher than the number of commuters due to the fact that some will carpool and others may use public transportation (South Station and Aquarium are within walking distance). In addition to these factors, construction workers generally travel before peak hours, thereby not contributing significantly to the highest hour volumes.

Parking accommodations for construction workers during Phase I of Fan Pier will be provided on the site of Phase II. Subsequent construction phases provide parking.

MITIGATION MEASURES

As a result of the many public and private projects that have been or will be developed in South Boston and downtown, including the Fan Pier and Pier 4 projects, traffic growth can be expected throughout the study area through the end of the century. As demonstrated in the preceding traffic impact analysis, some intersections in the study area will be able to absorb the cumulative growth from all developments and still maintain acceptable levels of traffic service. Other intersections will be handling volumes at or in excess of their traffic-handling capacity during the peak hours, particularly for the condition without a Seaport Access Road/Third Harbor Tunnel.

It should be emphasized that the earlier discussion with respect to the timing and phasing of the Depressed Central Artery/Seaport Access Road/Third Harbor Tunnel applies here as well. That is, all three components are assumed to be implemented as one project, but if the Seaport Access Road and Third Harbor Tunnel are completed prior to the Depressed Central Artery, most of the benefits would still accrue to the South Boston study area. It also is assumed that the Seaport Access Road and Third Harbor Tunnel would be built in tandem. Therefore, any reference in this section to one assumes that the other is also included.

Much of the study area's future estimated traffic would occur even without the proposed Fan Pier and Pier 4 Developments because of the continuing growth trend in the area. Nonetheless, the proponents are concerned with all traffic growth and feel it is important to outline a comprehensive program of measures to mitigate potential adverse impacts, especially because of the residential character of South Boston to the south of the new development sites. The proponents have included mitigation measures in three general categories: Traffic Operations Improvements, New Roadway Capacity, and Demand/Reduction Management. These consider not only the proponents' projects, but also the larger traffic growth caused by other developments. Many of the specific suggestions to relieve traffic impacts in the study area are dependent on actions by governmental agencies. The proponents are committed to work with the city and state to insure that a meaningful program of mitigation actions is identified and implemented. It is important in defining this program to also work closely with the South Boston Civic Advisory Committee (CAC) and local residents so that mitigation actions are compatible with their concerns.

The mitigation section is organized as follows:

- First, assuming that the proposed Seaport Access Road/Third Harbor Tunnel system is in place by the Full-Build 1995 design year, a description of "Traffic Operations Improvements" that would be required at those locations that still have problems is presented. This section demonstrates that virtually all of the problems in South Boston will occur even without the Fan Pier and Pier 4 projects.

- Second, assuming that the Seaport Access Road/Third Harbor Tunnel is not provided by Full-Build in 1995, a supplementary program of "Traffic Operations Improvements" is provided. This includes those locations that would become deficient as a result of not having the Seaport Access Road/Third Harbor Tunnel, in addition to those locations identified as having problems even with the Seaport Access Road/Third Harbor Tunnel. The latter case is required to show the changes in V/C ratio at these intersections when the Third Harbor Tunnel/Seaport Access Road is not available. Also, without the new facilities, certain locations require different mitigation measures. This scenario is equivalent to the "worst-case" analysis. Once again, it will be evident that most problems are expected to occur even under the No-Build scenario.

- Third, proposed measures dealing with "New Roadway Capacity" are described. These are recommended for implementation regardless of whether or not the Third Harbor Tunnel/Seaport Access Road is available.

- Finally, a comprehensive program of mitigation measures in the "Demand Reduction/Management" category is presented. This includes options that are aimed at reducing vehicle traffic through encouragement of other travel modes, or by managing vehicle traffic more efficiently. These measures also are proposed with or without a Third Harbor Tunnel/Seaport Access Road because they are good transportation management procedures that would result in much improved mobility in the study area and in the larger Boston region.

Table IV.1-41 summarizes the mitigation program discussed on the following pages and indicates the implementing agency or organization for each measure. It should be noted that although the program focuses on the 1995 Full-Build case, planning should begin now for implementation of as many measures as can be provided over the next several years, since all will provide benefits to traffic flow now and in the immediate future, even in the No-Build case.

■ Traffic Operations Improvements

Intersection-Related Improvements

As noted in the impact section, several analysis locations exhibit capacity deficiencies in the 1995 analysis year with a Seaport Access Road/Third Harbor Tunnel and several more without the facility. Some of these are shown to be deficient even under 1995 No-Build conditions. The following discussion focuses on traffic operations that are proposed at those locations where Level of Service "E" or "F" conditions are as a result of the projects themselves, or where a location already deficient under No-Build conditions will be impacted further by the projects (five percent or more in terms of V/C ratio). All of the analyzed locations are in the second category, except for one with the Tunnel (Relocated Northern Avenue/Pittsburgh Street), and three without the Tunnel (Relocated Northern Avenue/Seaport Access Road Entrance, Summer Street/Viaduct, and West Broadway/A Street). This indicates that

TABLE IV.1-41
Summary of Mitigation Program

Category	Mitigation Measure	Implementing Agency/ Organization
Traffic Operations Improvements	o Intersection-Related improvements	o BTPD, MDC
	o Arterial-Related improvements	o BTPD
	o System-Related improvements	o BTPD
	o Neighborhood Traffic Operations Study	o BTPD
New Roadway Capacity	o Advance construction of links to Seaport Access Road	o BTPD, MDPW
	o Railroad cut bypass route	o MDPW
Demand Reduction/ Management	o Employer-Sponsored Program	o Fan Pier/Pier 4 proponents
	o Shuttle bus service	o MBTA, Fan Pier/ Pier 4 proponents
	o Expanded commuter boat service	o MDPW, MBTA, EOTC
	o Water shuttle	o MBTA, BRA, EOTC, Fan Pier/Pier 4 proponents, other developers, Massport
	o Water taxi	o MBTA, BRA, EOTC, Fan Pier/Pier 4 proponents, other developers, Massport
	o Multi-Modal South Station Transportation Center	o MBTA, BRA
	o Transit subsidies	o EOTC, MBTA, Massachusetts Legislature, MDPW
	o Public parking rates	o MBTA, BRA

TABLE IV.1-41 (Continued) Summary of Mitigation Program

Category	Mitigation Measure	Implementing Agency/ Organization
Demand Reduction/ Management (continued)	o Public transportation information and demonstration program	o MBTA, MDPW, BTPD, other agencies as required
	o Hotel marketing and courtesy shuttle	o Fan Pier/Pier 4 proponents, other developers
	o Parking supply and management	o Fan Pier/Pier 4 proponents, other developers, BRA
	o MBTA transit improvements	o MBTA
	o Pedestrian access	o BTPD, BRA, MDPW
	o South Shore commuter rail	o MBTA, CTPS, EOTC
	o Satellite parking	o CTPS, MBTA, MDPW

* BRA = Boston Redevelopment Authority
BTPD = Boston Traffic and Parking Department
CTPS = Central Transportation Planning Staff
EOTC = Executive Office of Transportation and Construction
Massport = Massachusetts Port Authority
MBTA = Massachusetts Bay Transportation Authority
MDC = Metropolitan District Commission
MDPW = Massachusetts Department of Public Works

most of the future traffic growth anticipated in the study area will be sufficiently large to cause problems whether or not the Fan Pier and Pier 4 projects are built. Figure IV.1-21 shows the locations requiring mitigation with the Seaport Access Road/Third Harbor Tunnel.

The types of measures included here are basically those that can be implemented relatively easily, quickly and inexpensively. They attempt to make maximum use of already existing facilities without the need for major reconstruction, except in those instances where planned facilities have not yet been constructed. The recommended measures for the condition with the Seaport Access Road/ Third Harbor Tunnel are summarized in Table IV.1-42 and discussed below. All of these would be the responsibility of the Boston Traffic and Parking Department (BTPD) except for improvements on Day Boulevard, which is a Metropolitan District Commission (MDC) facility.

FIGURE
IV.1-21
Traffic
Mitigation
Locations

● Mitigation Locations with Third Harbor Tunnel

▨ Additional Mitigation Locations without Third Harbor Tunnel

▰ Arterial Related Improvements

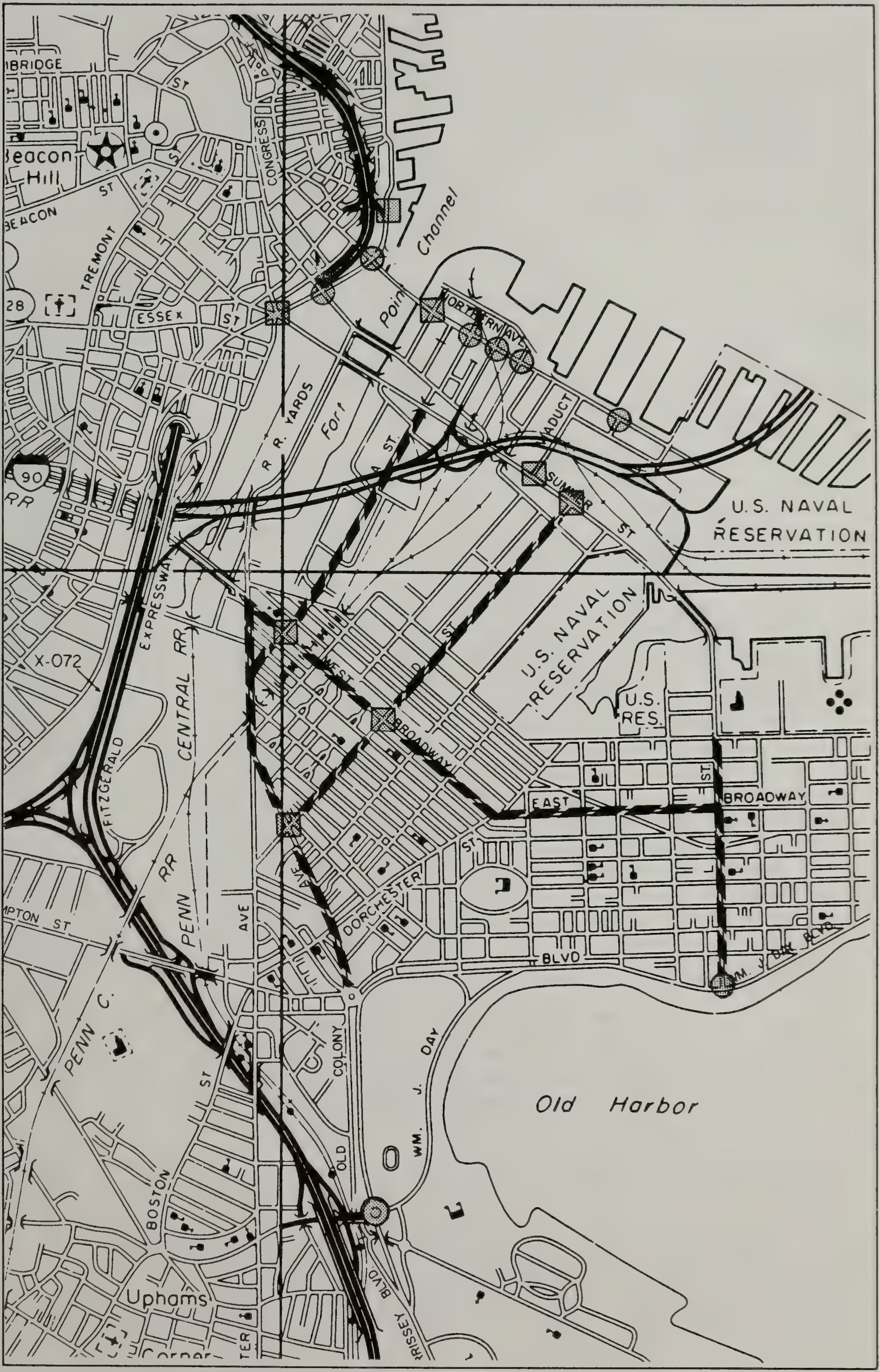

TABLE IV.1-42
Intersection Mitigation with Seaport Access Road/ Third Harbor Tunnel

Intersection	Mitigation Measures	V/C Ratio (1995)* No-Build	Build	Build with Mitigation
Relocated Northern Ave./ Pittsburgh	3rd lane on Northern Ave. westbound	0.89 (PM)	1.00	0.74
Relocated Northern Ave./ Seaport Access Rd. Entrance	3rd lane on Northern Ave. westbound; 5th lane on access road extension; two left-turn lanes into entrance road; 3-phase signal	0.99 (PM)	1.18	1.05
Relocated Northern Ave./ Seaport Access Rd. Exit	4th lane on exit road	0.95 (AM)	1.18	0.91
Atlantic/Congress	AM and PM peak hour no-parking on Congress westbound from Channel to Atlantic and on Atlantic from Summer to High	1.05 (AM)	1.15	0.98
Relocated Northern Ave./ Atlantic	AM and PM peak hour no-parking on Atlantic from Summer to High	1.02 (PM)	1.14	1.04
Northern Ave./ Ramp	Signalization; double left-turn lane on Ramp St.	** (PM)	**	0.61
L/Day	Signalization; restrict parking on L to one side from Day to Broadway; PM peak hour no-parking on Day westbound west of L; no left turn from L into Day	** (AM)	**	0.78
Columbia Circle	No operational improvement feasible	1.19 (AM)	1.26	1.26***

* During the most critical peak hour, which is indicated in parentheses in the No-Build column.

** No available reserve capacity at unsignalized intersection

*** Would probably cause diversion to signalized intersections below rotary.

Relocated Northern Avenue/Pittsburgh Street. With the Third Harbor Tunnel, Relocated Northern Avenue would require a third through lane in the westbound direction. The extra lane would reduce the critical PM peak hour V/C ratio from 1.00 to 0.74. If Relocated Northern Avenue is redesigned to allow for parking lanes on each side, as may be desired by the BTPD, the westbound side could have a peak period parking prohibition to provide for three-lane operation.

Relocated Northern Avenue/Seaport Access Road Entrance. With the Third Harbor Tunnel, the PM V/C ratio would be at 1.18 if no improvements were made. This can be reduced to 1.05 with the addition of a fourth lane on the connection between Relocated and Old Northern Avenues that feeds into the Seaport Access Road Entrance; by allocating lanes on the three-lane westbound Relocated Northern Avenue approach to include a left-turn lane, a shared through/left lane, and a through lane; by having three-phase signal operation; and by providing a fifth lane for right turns from the access road extension southbound into Relocated Northern Avenue westbound.

Relocated Northern Avenue/Seaport Access Road Exit. This location will operate acceptably without the Third Harbor Tunnel, but would require a fourth approach lane on the exit road for the heavy right turn movement when the Third Harbor Tunnel is in place. This would reduce the AM V/C ratio from 1.18 under three-lane operation to 0.91 with four lanes.

Atlantic Avenue/Congress Street. A prohibition on peak hour parking on both Atlantic Avenue (Summer Street to High Street) and Congress Street (Fort Point Channel to Atlantic Avenue on the westbound side) is required in both the AM and PM peak periods, particularly the former. This measure would reduce the critical AM V/C ratio from 1.15 to 0.98 by allowing an extra through lane on Atlantic Avenue and an additional lane for right turns on Congress Street.

Relocated Northern Avenue/Atlantic Avenue. The AM and PM peak hour parking restriction on Atlantic Avenue proposed earlier would tend to help operations at this location (1.14 V/C ratio in the critical PM peak hour reduced to 1.04). However, conditions would still be above capacity due to the very high demands through this intersection, particularly across the new bridge.

Northern Avenue/Ramp Street. This location should be signalized with a double left-turn lane on Ramp Street. The projected operation without signalization indicates that no reserve capacity would be available. However, with signalization, the V/C ratio would be 0.61 in the PM peak.

L Street/Day Boulevard. This location requires full signalization along with geometric improvements to obtain additional lanes, but the room to do so is restricted, particularly along L Street. Therefore, it is recommended that a partial solution be implemented which includes signalization, restriction of parking on L Street to one side at all times (see L Street description under Arterial-Related Improvements below), prohibition of parking on the westbound side of Day Boulevard west of L Street during the PM peak period, and no left turn from L Street into Day Boulevard, which is a very light movement but which takes green signal time away from other movements. These measures would improve operation to 0.78 V/C ratio in the more critical AM peak from a condition of no available reserve capacity under unsignalized operation. The proposed PM peak parking restriction would make operations acceptable during the outbound commuter peak.

Columbia Circle. The most critical movement is the weave involving Morrissey Boulevard traffic crossing the flow from Columbia Road to Day Boulevard. Due to geometric restrictions, no operational improvement is possible. Signalization would only result in increased congestion and delay. It appears that localized constraints at the rotary would cause diversion of additional traffic through the signalized intersections below the rotary.

For the condition without the Seaport Access Road/Third Harbor Tunnel, eight locations would need to be added to the list of mitigation actions. These are shown in Figure IV.1-21 and Table IV.1-43. The table presents two groups of locations. Group A includes the same ones listed earlier in Table IV.1-42 for the condition with the Seaport Access Road/Third Harbor Tunnel, but repeats them here because they have different V/C ratios without the Tunnel. Some also required different mitigation measures. Group B includes the eight new locations requiring mitigation if the Tunnel is not provided. Only the Group B locations are included in the discussion that follows the table.

Summer Street/Viaduct. The critical time period is the morning peak hour with a V/C ratio of 0.95 due to heavy inbound flows on Summer Street which turn right onto the Viaduct. This can be improved by prohibiting AM peak period parking on Summer Street's westbound side and restriping the Viaduct for four-lane operation (two 10-foot lanes in each direction). This will allow two right turn lanes into the Viaduct from Summer Street, one being a shared through/right. The turning radius would have to be improved to allow these turns to be made more easily. Signal retiming is also recommended to apportion green time in proportion to peak period traffic flows. These measures will improve the V/C ratio to 0.66. The PM peak

TABLE IV.1-43
Intersection
Mitigation
Without
Seaport Access
Road/Third
Harbor Tunnel

Intersection	Mitigation Measures	V/C Ratio (1995)* No-Build	 Build	 Build with Mitigation
A. Locations Requiring Mitigation With the Third Harbor Tunnel/Seaport Access Road (see Table IV.1-42)				
Relocated Northern Ave./ Pittsburgh	3rd lane on Northern Ave. westbound; 3rd approach lane on Pittsburgh St.	1.14 (PM)	1.41	1.06
Relocated Northern Ave./ Seaport Access Rd. Entrance	3rd lane on Northern Ave. westbound;	0.81 (PM)	0.94	0.71
Relocated Northern Ave./ Seaport Access Rd. Exit	No mitigation required without Third Harbor Tunnel/Seaport Access Road	0.73 (PM)	0.87	NA
Atlantic/Congress	AM and PM peak hour no-parking on Congress westbound from Fort Point Channel to Atlantic and on Atlantic from Summer to High	1.19 (AM)	1.31	1.09
Relocated Northern Ave./ Atlantic	AM and PM peak hour no-parking on Atlantic from Summer to High; requires Third Harbor Tunnel	1.22 (PM)	1.42	1.30
Northern Ave./ Ramp	Signalization; double left-turn lane on Ramp St.	** (PM)	**	0.79
L/Day	No signalization; restrict parking on L to one side from Day to Broadway; PM peak hour no-parking on Day westbound west of L; requires Third Harbor Tunnel.	**	**	***
Columbia Circle	No operational improvement feasible; requires Third Harbor Tunnel	1.65 (AM)	1.93	1.93+

TABLE IV.1-43

(Continued)

Intersection Mitigation Without Seaport Access Road/Third Harbor Tunnel

		V/C Ratio (1995)*		
Intersection	Mitigation Measures	No-Build	Build	Build with Mitigation
B. Additional Locations Requiring Mitigation Without the Third Harbor Tunnel/Seaport Access Road				
Summer/Viaduct	AM peak hour no-parking on Summer westbound from D to Viaduct; PM peak hour no-parking on Summer eastbound from bridge west of Summer to D; stripe 4 lanes on Viaduct; improve turn radius into Viaduct; retime signal	0.93 (AM)	0.95	0.66
Atlantic/Summer	One-way northbound flow on Atlantic south of Summer; AM & PM peak hour no-parking on Atlantic from Summer to High and on Summer westbound from Fort Point Channel to Atlantic	1.14 (AM)	1.22	0.96++
West Broadway/A	PM peak hour no-parking on A southbound from Broadway approach to W. 4th St.	0.85 (PM)	1.01	0.66
Old Colony/D	AM peak hour no-parking on Old Colony northbound from Columbia Park to Dorchester Ave.; PM peak hour no-parking on Old Colony southbound from Dorchester Ave. to Columbia Park	1.13 (PM)	1.29	1.08
Atlantic/High	No operational improvement feasible; requires Third Harbor Tunnel	1.07 (PM)	1.15	1.15+++
Relocated Northern Ave./ Sleeper	3rd lane on Northern Ave. westbound; 3-phase signal; requires Third Harbor Tunnel	1.41	1.93	1.20©

TABLE IV.1-43
(Continued)
Intersection
Mitigation
Without
Seaport Access
Road/Third
Harbor Tunnel

Intersection	Mitigation Measures	V/C Ratio (1995)* No-Build	Build	Build with Mitigation
Summer/D	AM peak hour no-parking on Summer westbound from D to Viaduct;, PM peak hour no-parking on Summer eastbound from bridge west of Viaduct to D	0.91 (PM)	1.07	0.82
D/West Broadway	Eliminate double parking on Broadway	1.01 (PM)	1.10	1.00

* During the most critical peak hour, which is indicated in parenthesis in the No-Build column.

** No available reserve capacity at unsignalized intersection.

*** Still has no available reserve capacity but will have fewer delays and increased safety

+ Would probably cause diversion to signalized intersections below rotary.

++ Further improvements can be obtained by providing another subway portal on the northwest corner of the intersection to reduce surface pedestrian traffic.

+++ 0.61 with Third Harbor Crossing.

© 0.74 with Third Harbor Crossing

period, although less critical, can be improved by prohibiting parking during this period on the eastbound side of Summer Street to allow three-lane operation through the intersection toward D Street, assuming that a two-lane approach is maintained on the Viaduct toward Summer Street.

Atlantic Avenue/Summer Street. This location is heavily affected by pedestrian traffic from South Station, particularly across Atlantic Avenue. Pedestrians utilize about 30 percent of the available green time. It should be noted, however, that due to their location, the Fan Pier/Pier 4 projects will not add pedestrian traffic across Atlantic Avenue from South Station. If there were normal pedestrian traffic volumes at this intersection, it would operate in the acceptable range instead of with a V/C ratio of 1.22 in the AM peak and 1.19 in the PM peak. However, these ratios can be improved if additional travel lanes can be made available as follows:

- Atlantic Avenue south of Summer Street is scheduled to be converted to one-way operation northbound. This will allow an additional through lane on the approach to Summer Street.

- To take full advantage of this extra lane, restrict parking as mentioned earlier on the east side of Atlantic Avenue from Summer Street to High Street during both the AM and PM peak periods.

- Restrict parking on the westbound side of Summer Street from the Fort Point Channel to Atlantic Avenue to obtain an extra lane for right turns.

These measures would reduce the V/C ratios to 0.96 in the AM and 0.91 in the PM. Further improvements can be achieved by providing another subway portal on the northwest corner of the intersection (adjacent to the Trailways terminal) to reduce the number of surface pedestrian crossings.

West Broadway/A Street. This location is acceptable in the morning peak but has a V/C ratio of 1.01 in the PM peak, due to the heavy southbound flow on A Street toward West Fourth Street. This can be remedied by using the southbound parking lane during this period as an extra lane for through traffic and right turns. The prohibition should extend from the Broadway approach through West Fourth Street. The V/C ratio would thus be improved to 0.66.

Old Colony Avenue/D Street. The main problem at this location is the heavy PM left turn from D Street onto Old Colony Avenue. However, there is no real opportunity to relieve this condition due to restricted geometry on D Street. Some improvement can be gained by reducing the need for green time on Old Colony Avenue by means of a peak period parking restriction on the southbound side to allow three-lane operation. To be most effective, the restriction should extend from Dorchester Avenue to Columbia Park. This would reduce the V/C ratio from 1.29 to 1.08 at D Street. A similar but less intense problem exists in the AM, with a V/C of 1.00. A morning parking restriction on the northbound side in this same area would allow for three-lane operation and would bring the ratio into the acceptable range.

Atlantic Avenue/High Street. Improvements can only be achieved through extensive reconstruction because full use is already made of all available lanes under existing and future analysis scenarios. The Seaport Access Road/Third Harbor Tunnel is required to ameliorate conditions at this location.

Relocated Northern Avenue/Sleeper Street. As discussed previously for other locations along Relocated Northern Avenue, a third through lane is required on the westbound side. In addition, three-lane operation will be required to accommodate the heavy left turns into Sleeper Street. To be most effective, the third through lane would have to be carried across the Relocated Northern Avenue Bridge into downtown, utilizing the proposed 33 feet of pavement area as three 11-foot lanes. Even with these improvements, the V/C ratio will be reduced from 1.93 in the AM peak hour only to 1.20. With the Seaport Access Road/ Third Harbor Tunnel, this location does not have a capacity problem.

Summer Street/D Street. With the peak period parking restrictions proposed earlier along Summer Street, this location can be improved from a V/C ratio of 1.07 in the critical PM peak hour to 0.82. The restriction includes the westbound side of Summer Street in the AM and the eastbound side in the PM.

D Street/West Broadway. Even though D Street constraints are more critical, operation at this location can be improved by eliminating the double-parking activity on Broadway, thereby allowing use of the second through lane which is already available but cannot effectively be used. This would improve operation in the AM peak period from a V/C ratio of 1.05 to 1.00.

Arterial-Related Improvements

The impact section identified several capacity and safety-related deficiencies associated with the morning and evening peak hours along the main commuter-oriented arterials through South Boston. These are existing problems which may be remedied at least in part by means of the measures identified below. It should be noted, however, that some of these arterials pass through the residential area of South Boston, and any measures taken to improve the flow of vehicular traffic on these streets must be weighed against the wishes and concerns of neighborhood residents. Responsibility for implementation rests with the BTPD. Arterial-related locations requiring mitigation are shown in Figure IV.1-21.

A Street. The most effective improvement would include upgrading the signal equipment at West Broadway, West Fourth Street, and Dorchester Avenue/West Fifth Street and coordinating the signal controllers to permit smoother traffic flow through these closely-spaced intersections. Signal timing should consider the heavy truck traffic along this section of A Street (which is part of the designated truck route through South Boston), but should also include appropriate pedestrian intervals. Repaving the entire length of A Street would also be beneficial, and parking prohibitions on all intersection approaches would facilitate turns. It should be noted that implementation of another mitigation measure--the Railroad Cut Bypass Route, which is discussed below under "New Roadway Capacity"--would have an even greater positive effect along A Street due to the diversion of truck traffic to that roadway.

D Street. A problem similar to A Street exists on D Street. Although spacing between adjacent traffic signals is greater, D Street would benefit from new equipment and coordination among the signals at Dorchester Avenue, Old Colony Avenue, West Seventh Street, Broadway, and Cypher Street. Appropriate pedestrian intervals should be included. A well-signed truck prohibition should be in place throughout the residential portion of D Street (south of West First Street, which is part of the designated truck route). The portion of D Street north of West First Street should be repaved. Consideration should be given to relocating on-street truck loading docks and to increasing tight turn radii at intersections where feasible. With evening peak period speeds averaging only 10 mph, it is important to enforce the no-parking regulation on the southbound side of the street.

L Street. Traffic signal upgrading, including pedestrian intervals, would be beneficial in this corridor with coordination between signals at East First Street and East Broadway, and between those at East Eighth Street and Marine Road. The spacing between these two groups is probably too great to allow effective coordination. This corridor, however, suffers from very narrow travel lanes south of East First Street with parking permitted on both sides. Consideration should be given to limiting parking to one side of the street, preferably at all times, or at least during both peak periods of heavy commuter flow. Similar to D Street, a truck prohibition that is well-signed should be in place along L Street south of the designated truck route along East First Street.

Old Colony Avenue/Dorchester Avenue. The portion of Old Colony Avenue between Columbia Park and Dorchester Avenue should have a parking prohibition during the AM and PM peak periods to allow three-lane operation. The section of Dorchester Avenue between Old Colony Avenue and West Broadway should be regraded and repaved to eliminate the uneven roadway surface in the northbound direction. Consideration should be given to a minor widening on the northbound side to straighten the curve somewhat. Signal timing should be checked for compatibility with traffic flows at all signalized intersections along this route, particularly in the PM peak period.

East and West Broadway. The major problem along most of this roadway west of L Street is double-parking which severely restricts the flow of traffic and results in congestion, delay, and an unsafe condition. The short-term parking limit along both sides of Broadway should be enforced to eliminate meter-feeding and free up these spaces for additional parkers. Double-parking should be eliminated through strict enforcement.

Designated Truck Route. To alleviate truck traffic through the heart of the South Boston residential area, the city has designated a truck route along mostly commercial/industrial streets between the Southeast Expressway and the industrial areas of South Boston. The route runs along portions of Southampton Street, Dorchester Avenue, A Street, West Broadway, C Street, and First Street (West and East). To encourage the use of this route by commercial vehicles and thereby reduce truck traffic through the residential portions of South Boston, the following measures are recommended:

- Additional and clearer signing of the truck route, beginning at the Southeast Expressway
- Increased enforcement of no-parking restrictions along the route
- Elimination of on-street truck loading
- Additional signing along residential streets prohibited to trucks
- Increased enforcement along no-truck routes
- Improvement of the West First Street/B Street intersection for truck movements by widening sharp corners and improving the pavement surface.
- Follow through on the improvements proposed by the MBTA for the West Broadway/Dorchester Avenue intersection (including relocation of the bus station and redesign of the intersection geometry).

System-Related Improvements

Certain measures which relate to the entire study area rather than to individual intersections or streets include the following. The BTPD would be the implementing agency.

Traffic Signal System Optimization. It has been demonstrated that one of the most effective ways to improve traffic flow on an areawide basis is to improve the traffic signal system. Therefore, a comprehensive analysis of the existing signal system in the South Boston area is recommended. The Boston Traffic and Parking Department is in the process of upgrading many of its signals to an advanced computer-based system using real-time detection of actual traffic conditions on selected links. This should include the South Boston subarea. The upgraded system can be analyzed for signal timing effectiveness using a computer model such as TRANSYT-7F. Such improvements have been shown to improve speed and travel time by 8 to 12 percent.

Such an analysis may show that a reallocation of green time at certain locations is possible within the context of overall network control. Strategic shifts of current (or future) underutilized green time would further optimize vehicle flow and reduce queue lengths and congestion.

Enforcement. With the implementation of the computerized traffic violation program and widespread use of the "Denver Boot" by the BTPD, the city is stepping up its enforcement of parking regulations. Nevertheless, there is still room for improvement. Vigorous enforcement can provide the "extra capacity" that is already built into the roadway system, but which goes unused because of illegal parking. It is proposed that a concentrated effort be continued to insure that more of this capacity is available for peak period use. In particular, elimination of double parking on Broadway, illegal parking activity along the designated truck route, illegal parking in lanes designated for through traffic during peak commuting hours, and unwarranted truck activity on no-truck streets should be given priority. Towing should be a major component of the enforcement effort.

Commercial Vehicle Restrictions. Actions to reduce vehicle use in congested areas should consider all travel, including goods movement. One significant factor that often contributes to street congestion is delivery/loading activity by commercial vehicles, particularly the larger trucks which utilize South Boston streets. However, restrictions on truck deliveries are particularly difficult to implement because of the large number of vehicle operators involved. The vast majority of trucks are single-vehicle operations or are from small fleets. Various proposals have been made for restricting traffic in peak hours, including time shifts in deliveries, permits, and vehicle size limitations.[1]

Time shifts in delivery schedules may help reduce peak hour traffic conditions. One approach is to schedule goods and services traffic before or after the morning rush period. Because the morning rush period is slightly shorter than the afternoon rush period, the morning period generally has more uncongested time available. Many commercial vehicles already make early deliveries, which indicates that restructuring of delivery times has some acceptance. Another approach is to encourage more night deliveries. In some cases, the installation of "night-drop" facilities (analogous to the night mail-drops and bank deposits) can facilitate a shift to night deliveries.

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[1] Much of the discussion involving truck deliveries is based on "Actions to Reduce Vehicle Use in Downtown Areas," John Crain et al., Transportation System Management, Transportation Research Board, Special Report 172, 1977.

Permits can be issued for commercial vehicles so that only those that need to be in the congested area during the peak period have legal access. Such permit systems may have to be augmented with designated truck routes and appropriate signage to divert non-permit commercial vehicles away from the congested area.

Vehicle-size restrictions can be imposed. Large trucks and commercial vehicles tend to aggravate traffic congestion during peak periods, but smaller vehicles (such as panel trucks and pickups) have operating characteristics and parking requirements similar to automobiles. Therefore, if the larger vehicles are excluded in specific areas during peak periods, traffic may flow more freely. Again, this could be done in conjunction with the proposed new Railroad Cut Bypass Route discussed in the subsequent section on New Roadway Capacity.

On-street truck loading currently occurs at many locations in South Boston. These activities block portions of through roadways, encouraging truck drivers to use alternate routes (including residential streets) to avoid the congestion caused by the unloading activities. This can be alleviated by encouraging private warehouses to relocate their loading docks to off-street locations. This effort should be undertaken both on and off the designated truck route to eventually eliminate all on-street loading.

It is recommended that the BTPD work with employers in South Boston to encourage implementation of these measures, and that appropriate zoning changes be implemented as required to allow off-street loading facilities.

Neighborhood Traffic Operations Study

As noted in earlier sections, because the study area was large to begin with, the traffic analysis was limited to representative intersections and the main commuter routes specified by MEPA in the scoping process. This project-specific EIR cannot resolve the larger transportation planning issues of the South Boston area and nearby regional transportation facilities. However, it is recognized that the South Boston community has legitimate concerns about traffic flow and pedestrian safety throughout the neighborhood, including concerns about many locations that were not included in the Draft EIR.

Therefore, it is recommended that the BTPD conduct a neighborhood traffic planning study of the type now being undertaken in several other areas of the city. The nature of this study should be such as to focus attention on the issues of most concern to local residents. Items recommended for inclusion are:

- Traffic to the Boston Marine Industrial Park (BMIP) via I and K Streets.
- Bypass traffic in general on E and F Streets.
- Bypass traffic on Dorchester Street and Old Harbor Street (around the Dorchester Heights monument).
- The West 7th Street/Dorchester Street feeder routes.
- Illegal parking on certain streets due to the influence of the BMIP, the Barnes Building, and other facilities.
- The effect of commercial truck traffic on neighborhood streets.
- Approaches to promoting pedestrian safety in general and along commuter routes in particular, including such measures as the painting of crosswalks at intersections, provision of crossing intervals at traffic signals with pedestrian-actuated pushbuttons, prohibition of parking at intersections to improve visibility, and other measures.
- Working with the MDC to consider the benefits and liabilities of its tentative proposal to prohibit commuter traffic along Day Boulevard.
- Possible changes in traffic circulation in the residential portions of South Boston to discourage commuter and truck traffic.

■ New Roadway Capacity

This section considers options which can provide additional roadway capacity through new construction.

Advance Construction of Links to the Seaport Access Road

Whether or not the Seaport Access Road is built, it would be highly desirable to construct as soon as possible the proposed connections to that planned facility between Relocated Northern Avenue and Congress Street. This would involve two one-way roadways running parallel to and between Pittsburgh Street and B Street, as shown earlier in Figure IV.1-5. These links would help to disperse traffic between the project sites and the west via Congress Street and Relocated Northern Avenue, and to the south via Congress, B, Fargo and D Streets as well as Northern Avenue, Ramp, Viaduct, Summer and D Streets.

However, the section of Congress Street east of Stillings Street would have to be upgraded by removing the cobblestones and railroad tracks and then paving. B Street between Congress and Fargo Streets, along with Fargo Street between B and D Streets, should be repaved. These new roadways can eventually be tied into the other new facility described below, but are not dependent on its implementation, which would be done by the BTPD and MDPW.

Railroad Cut Bypass Route

In 1980, a study[2] was conducted to determine the feasibility of several options proposed to alleviate truck traffic in South Boston, as well as to improve access to the seaport area. One of the alternatives evaluated was a new roadway linking the Southeast Expressway at the Southampton Street interchange with Summer Street, Congress Street, and Relocated Northern Avenue. Much of the route was proposed to be in the existing railroad cut running parallel to and just west of B Street and passing under Dorchester Avenue and West Seventh through West Second Streets. It was proposed for truck traffic only south of West First Street, primarily because the rail cut is only 32 feet wide and it would be prohibitively expensive to rebuild all of the bridges to permit more than two-lane operation for general purpose traffic. It is proposed here, however, that such a scheme is feasible if the two-lane road is utilized by trucks, buses, taxis and private autos with at least three occupants. At the northerly end, the road could tie into the new connections described above for access to Relocated Northern Avenue. It could also be connected to Fargo Street as an alternate route to the Army Base area via Summer Street, although Fargo Street would require repaving. It would provide a direct connection between the northern section of South Boston and the Southeast Expressway and should divert traffic, including the larger commercial vehicles, from South Boston Streets, which has been a source of concern to local residents. It would operate as a relief valve for the Southeast Expressway/Seaport Access Road route if congestion builds at the Massachusetts Avenue interchange as described in the impact section. It might also serve as an incentive to increase private automobile occupancy if cars with three or more passengers were permitted to use this as a shortcut to the Southeast Expressway beyond the Massachusetts Avenue congestion point. The implementing agency would be the MDPW.

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[2] "Preliminary Environmental Assessment, Seaport Access System, South Boston, Massachusetts," Fay, Spofford & Thorndike, Inc. and Wallace, Floyd, Ellenzweig, Moore, Inc., June 1980.

■ Demand Reduction/ Management

Employer-Sponsored Program

Reducing the amount of traffic generated and managing it more efficiently are effective alternatives to simply responding to problems created by uninhibited traffic growth. Much can be done at the employer level to develop programs in this area and to provide the proper incentives to make them work. To reduce auto use, the Fan Pier and Pier 4 proponents will, through their lease requirements, have future tenants introduce and maintain programs which encourage ridesharing as well as use of mass transportation. The efficacy of any incentive and promotional program is determined by the extent of follow-up. Programs must be actively promoted during their development and a plan for their long-term maintenance must be provided. Programs should be broad-based and include the following:

- Preferential parking for carpools/vanpools.
- Participation in a joint carpooling program with other tenants, neighboring organizations and companies.
- Provision by tenants of carpool/vanpool matching service.
- Sponsorship of Caravan (an organization which leases commuter vans and provides some administrative organizational help) or other van leasing program.
- Promotional material about the programs in tenant publications.
- Tenant sales to employees of MBTA passes and private bus line tickets.
- Provision of space in tenant areas for commuter information on routes, schedules, fares, carpools/vanpools, and pass/ticket programs.
- For employees who wish to commute via bicycle, provision by the proponents of a secure bicycle storage area.
- Consideration by tenants of a flex-time or staggered work hour system to reduce peak hour traffic impacts.
- Restriction of tenant delivery vehicles to off-peak periods.
- Appointment by tenants of a staff person to coordinate all of the above efforts.

Shuttle Bus Service

Although the projects are within a 10- to 15-minute walking distance of South Station on the Red Line (also commuter rail and express buses) and Aquarium Station on the Blue Line, the distances are not particularly convenient, especially in inclement weather. Local MBTA bus routes (6 and 7) connect the site with both stations. However, the service is currently inadequate to handle the projected new transit ridership from the projects, particularly to South Station. To facilitate the use of the transit measures cited in the employer-based program above, it is essential that a high-capacity, low-cost, frequent, and reliable connection be available between the sites and South Station. The proponents have indicated their willingness to work with the MBTA to provide such service or to consider implementing such a connection by means of a shuttle bus system between the project sites and South Station. The service could run on fixed or flexible routes, and would be available throughout the day from approximately 6:30 AM to 6:30 PM each weekday. Increased shuttle capacity would be provided at peak hours. Further information on such a service, including possible routings, frequencies, ridership, number and type of vehicles are provided in the Traffic Appendix.

A separate shuttle route which connects to other transit facilities will also be considered. It might service Rowes Wharf (commuter boat), Aquarium Station (Blue Line and commuter boat at Long Wharf), North Station (commuter rail, Orange and Green Lines), Haymarket (express bus, Orange and Green Lines), and the express buses originating/terminating in the financial district. This would insure improved accessibility to virtually all of the major regional public transportation services. Again, the service could be provided by the MBTA or the proponents working in cooperation with the MBTA. Bus connections to commuter boat and express bus services may not be required if one or more of the following four mitigation measures can be implemented.

The proponents are committed to an improved transit connection, although the exact nature of the service requires further study. It may be that a water shuttle service, if feasible (see below), or a combination of water and bus shuttle services, will emerge as the preferred alternative.

Expanded Commuter Boat Service

In recent years, the Commonwealth and various private boat operators have experimented with commuter boat service using equipment ranging from fishing boats to a high-speed hovermarine. Primarily because of the geography of Boston Harbor, these commuter routes have concentrated on the

South Shore area. Most have have attracted only moderate ridership due to limited equipment and schedules, relatively high fares, minimal amenities at terminal facilities, and uncoordinated downtown distribution services. Those who have commuted by boat, however, generally agree that it is a very pleasant alternative to daily auto commuting. State transportation planners indicate that Boston Harbor is drastically underutilized for water transportation, given the city's geographic orientation toward the water. In 1984, about 300,000 commuters were carried on the harbor, while other cities with water transportation systems are carrying many times this figure. The harbor's potential has been estimated to be in the range of two or three million commuter trips annually, which could significantly reduce auto travel into downtown.

The Fan Pier and Pier 4 projects, along with all of the proposed developments in South Boston, would be a large source of new commuter boat riders if appropriate facilities and connections can be provided in the area. To achieve the potential which has been estimated, a significantly expanded system of water transportation and support facilities will be required as recognized by both city and state agencies, which have been working together on implementation strategies. Being considered are connections to new development areas in South Boston; investment in additional commuter services which would permit improved scheduling, flexibility, and reliability; and better terminal facilities at both ends of the trip, including amenities for passenger comfort and convenience. At the South Shore end, terminal facilities should be expanded to include additional free parking near the boarding point and an all-weather waiting area. At the downtown end, weather-protected waiting areas should be provided along with bus connections to other downtown areas. This would ideally include a terminal in South Boston, possibly an upgraded facility at Commonwealth Pier. The bus connections should be coordinated with boat arrival/departure times. It is also important to coordinate the efforts of competing boat operators. The EOTC, MDPW, MBTA, other interested agencies, public interest groups, developers and boat operators have been exploring many of these concerns in biweekly meetings of the Water Transportation Task Force.

For the Fan Pier and Pier 4 projects, as well as others in South Boston and downtown, it is likely that about 30 percent of all trips would originate in South Shore communities (where commuter boat services are already in place) that would be susceptible to diversion to water transportation. This is based on a CTPS survey of vehicles parked in the Fan Pier and Cabot, Cabot and Forbes lots in South Boston. Therefore, a high-level South Shore water transport system conceivably could divert up to 30 percent of the net new peak hour vehicle-trips generated by the Fan Pier and Pier 4 Developments under the parking-constrained condition (see Table IV.1-18). This would amount to about 430 trips in the morning and 580 trips in the afternoon. Not all of these trips would actually choose water transportation, but the potential is significant, especially without a Seaport Access Road with connections to South Boston. Even with a 20 percent diversion to water transportation, about 100 fewer Fan Pier and Pier 4 vehicles would be on the roads during each peak hour. If this could be attained for other large new developments in the study area as well, the impacts on South Boston streets and the regional highway system would be lessened. It is also likely that improved South Shore water transport would attract additional trips from the Red Line. The extent of the diversion will, of course, be highly dependent on level of service and fares. The latter is discussed in further detail below under "Transit Subsidies."

Water Shuttle

At the request of the State Interagency Coordinating Committee, the Fan Pier proponent is studying the feasibility of a water shuttle which would service prominent waterfront locations such as major transit stations, the Fan Pier and Pier 4 projects, other developments, and public institutions. Such a water shuttle would improve access between the sites and public transportation nodes, fostering commuter use of mass transit to the Fan Pier and Pier 4. An intermodal water shuttle could provide an enjoyable alternative to land-based transit, particularly at peak hours, and could be used in lieu of or in addition to the previously discussed bus shuttle system. Other groups, such as the Boston Harbor Associates and the Boston Chamber of Commerce, have also been exploring similar types of waterfront transportation systems. The MBTA, BRA, EOTC, Massport, as well as other agencies and developers, should also participate in this program.

Water Taxi Service

Unlike a commuter boat operation which serves long-haul trips, or a scheduled water shuttle, a water taxi service would cater to short on-demand trips around the harbor using smaller craft. The Massachusetts Port Authority has already had a successful experience with its Airport Water Shuttle this year, although this is a scheduled service. A true on-demand water taxi service would be ideal for trips between the Fan Pier and Pier 4 sites and North Station, Charlestown, East Boston (including the airport), and other harborside destinations in downtown, particularly during peak commuter hours when land connections may be difficult due to traffic congestion. Although difficult to quantify, benefits from a water taxi service would include reduced auto travel in critical areas such as the Fort Point Channel crossings, the Callahan and Sumner Tunnels, and the Mystic River crossings. Such services have been used very successfully in other cities (e.g., Stockholm). A water taxi to Rowes Wharf, Long Wharf, Aquarium Station and North Station could be used in place of or in addition to the bus shuttle system discussed earlier. Docking facilities would need to be provided by developers and agencies such as the MBTA, BRA, EOTC, and/or Massport along the waterfront in appropriate locations. The Pier 4 proponent is, with the encouragement of the State Interagency Coordinating Committee, planning to sponsor a pilot water taxi program in conjunction with the existing Pier 4 Restaurant. Results of this program will be used to refine and expand the service as ridership increases with successive phases of development.

Multi-Modal South Station Transportation Center (SSTC)

The SSTC will be a great improvement over the existing operation (as described earlier under "Planned Improvements"). However, it will not service express buses which currently terminate at Haymarket and in the financial district, oriented to the north and west, respectively. It would be desirable, if feasible, to utilize the SSTC as a true multi-modal facility by facilitating transfers between all, or many of, the major public transportation services in downtown. This is particularly important in light of the continuing development trend in the Fort Point Channel area of South Boston. The shuttle bus system proposed earlier between South Boston developments and South Station could be even more effective if additional express bus services were available at the SSTC with direct connections to the regional highway system, eliminating the need to use local streets.

Transit Subsidies

The realities of funding constraints cannot be ignored, neither can the need to provide incentives to encourage commuters to switch from driving to public transportation.

The first priority must be the provision of good, reliable, convenient transit service. The cost of that service is also an important factor in a commuter's choice of mode. All public transportation services must be subsidized by government, even heavily if necessary, to attract ridership and to hold it. This should also apply to the less conventional forms of public transportation such as commuter boat operations, particularly during startup periods. Additional state and federal funding should be pursued by the EOTC, MBTA, MDPW, and State Legislature for all forms of public transportation, especially now that the Southeast Expressway reconstruction project has been completed and recently-converted transit users may once again decide to return to the private auto. Benefits will derive to the region by having a better, more actively used transit system.

Public Parking Rates

It should be standard policy to minimize the cost of parking at outlying public transportation feeder facilities which serve the downtown area, and to maximize parking costs in the Central Business District. The latter, however, should be tempered for higher-occupancy vehicles, encouraging the formation of carpools and vanpools. The MBTA and BRA would be the implementing agencies in this category.

Public Transportation Information and Demonstration Program

The MBTA, MDPW, Boston Traffic and Parking Department, and other city and state agencies should work cooperatively toward a systematic policy on information related to public transportation services available to the Boston commuter. This should include selection of an agency to direct the effort, establishment of a working committee with representatives from each agency to formulate policy and implement an approach, the appropriation of funds to undertake a professional public relations effort, and work with the media to not only disseminate the information on service availability but also to market those services continuously and aggressively. This program will be more effective if the incentive programs outlined above are implemented and if periodic free or lower-than-normal fare promotions are used to generate new ridership and to demonstrate the attractiveness of the service.

Local Bus Service

Originally, MBTA Bus Routes 6 and 7 operated along Summer Street, providing direct service between South Station and various points in South Boston. However, due to the deterioration of the bridges along Summer Street, the buses were relocated to Northern Avenue. If and when these bridges are rehabilitated, the MBTA intends to return both Routes 6 and 7 to Summer Street. However, consideration should be given by the MBTA to expanding the route structure of its local bus runs in South Boston due to the impending developments in that area. Scheduled service will continue to be required along Northern Avenue, providing good connections to various downtown locations and supplementing any shuttle services that may be instituted between development sites and South Station. The MBTA has in the past indicated that it will consider schedule changes for Routes 6 and 7 if demand warrants it. Ridership figures for these routes will be monitored closely by the MBTA and any changes in bus service (such as adding or deleting trips) will be considered as appropriate. It is recommended that, as future developments along Northern Avenue come on line, service on MBTA Bus Routes 6 and 7, or an appropriate substitute service if these runs are shifted back to Summer Street, be expanded to include peak hour frequencies of 5- to 10-minute headways during the peak commuting hours. This will improve accessibility to downtown locations and transit services from other South Boston developments and further reduce vehicular travel on the major travel routes by encouraging non-project trips to use public transportation.

Hotel Marketing and Courtesy Shuttle

The Fan Pier and Pier 4 proponents will encourage project hotel operators to develop a close working relationship with the developers of other South Boston projects. Such a relationship could include, for example, the reservation of large blocks of project hotel rooms during major World Trade Center and Boston Design Center shows. By locating out-of-town employees and visitors in the Fan Pier and Pier 4 hotels, peak hour vehicular travel across the critical Fort Point Channel crossings could be reduced. Other available options include the operation of a courtesy van connecting the hotels with major South Boston and downtown destinations and Logan Airport, supplying up-to-date information to travel agents on the various water or bus shuttle services that will be serving the hotels, and dissemination of information on all available public transport services at the hotels themselves.

Parking Supply and Management

Although not a mitigation measure per se, the limitation of parking supply for the projects has beneficial impacts on local and regional highways. It is proposed that additional benefits be achieved through management by the project proponents of the available parking supply by allocating a certain number of spaces specifically to non-commuters. This could be done by making them unavailable for use before 9:30 or 10:00 AM. The traffic analysis was based on the assumption that all trip types (office and retail work and non-work trips) would be reduced equally due to parking space availability at the projects. However, if parking space allocations were made to favor short-term users as opposed to commuters, even fewer peak hour auto trips would result. This would serve as a strong incentive to use public transportation services or to share a ride with another driver. It should also be noted that the traffic analyses presented earlier in this chapter are based on an unconstrained parking supply for all background developments and, therefore, represent a worst-case analysis. Any further parking space limitations which might be applied to other developments in the study area will also translate into decreased traffic impacts.

MBTA Transit Improvements

To obtain the full benefits of its current program to upgrade the Red Line to permit use of six-car trains, the MBTA should continue to improve current headways during peak periods to handle traffic surges and unanticipated service problems. This should be done by acquiring sufficient cars (through purchase and/or rebuilding) and by continuing to work toward correcting the Red Line signal problems which have occurred in recent years. Finally, to insure that station capacity will be compatible with line capacity, continued efforts should be made to insure that transit stations can accommodate increased ridership. This effort could include improvements to such facilities as platforms, stairs, escalators, turnstiles, and access points to street level.

Pedestrian Access

Relocation of the Northern Avenue Bridge to the south and the current proposal to eliminate pedestrian access across the existing bridge would add about 500 feet to the walking distance between the sites and destinations such as Aquarium Station on the Blue Line and the commuter boat facilities at Rowes Wharf and Long Wharf. Irrespective of plans to create Harborpark attractions on the existing Northern Avenue bridge, it would be very desirable to retain pedestrian access across the entire span to shorten walking distances to the downtown area.

South Shore Commuter Rail

Interest has been increasing to revive commuter rail service to the South Shore, which was terminated about 25 years ago when the Southeast Expressway and Route 3 were constructed. With the large population growth on the South Shore and with increasing congestion on these regional roadways, reintroduction of rail service may be feasible. A new rail bridge would have to be built over the Neponset River and land reassembled along the original route. Also, the service would have to be studied in the context of existing and expanded water transportation service from the South Shore, as proposed above, since its service area would be about the same. Responsibility for implementing such service would rest primarily with the EOTC, with assistance from the MBTA and CTPS. The EOTC has indicated its commitment to study the feasibility of such service directly into South Station, or at least to a Braintree terminal with transfer to the Red Line.

Satellite Parking

The CTPS has been studying a series of satellite parking facilities located around the Boston metropolitan area, generally around Route 128, to intercept outlying vehicular trips and convert them to public transit trips via express bus or rapid transit. As an example, one such possibility being investigated on the South Shore is in Braintree on the site of the Town landfill adjacent to the Red Line with direct connections from Route 3. The satellite parking program, if implemented, will have the potential to divert auto trips from all commuting corridors. It is recommended that further studies be made of locations for inclusion in the program, and that the best sites be implemented.

Effect of Demand Reduction Strategies

Although there are many variable factors that make it impossible to quantify the precise effects of each of the above measures on traffic level of service or V/C ratio, it is clear that ridesharing and a first-rate multi-modal public transportation system, along with appropriate incentives for their use, can improve short-term and long-term traffic conditions. The potential exists for a substantial shift in commuting patterns from single-occupant private autos to other modes. Recent experience with express bus services, commuter rail, water transportation, and even conventional rapid transit indicates that people are willing to use these services. If such services can be improved as proposed, traffic conditions on Boston's streets and highways will improve.

IV.2

Traffic-Related Issues
Air Quality

INTRODUCTION

The objective of the air quality analysis is to determine if the proposed Fan Pier and Pier 4 developments will interfere with the attainment or maintenance of Massachusetts and National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO). The NAAQS were established by the federal Clean Air Act, and are designed to protect public health and welfare. To demonstrate compliance, it is necessary to identify human activity centers (sensitive receptors) exposed to maximum air pollutant levels from motor vehicle emissions in the project area. Using air quality modeling techniques, CO levels are estimated at these sensitive receptors for the Build and No-Build alternatives for the present and future years. Comparison of projected pollutant levels to the NAAQS permits evaluation of whether motor vehicle emissions related to the proposed developments will pose a threat to public health or welfare.

DESCRIPTION OF THE ENVIRONMENT

■ Pollutant Sources and Effects

The key source of project-related air pollution is from motor vehicles visiting the project site. Of the various air pollutants emitted, CO is used in this analysis as an indicator of roadway air pollution levels, since it is the most abundant and persistent pollutant emitted by motor vehicles. Also, since CO is a non-reactive substance, its concentration in the air can be easily predicted.

The adverse health effects of CO are a result of its combination with blood hemoglobin to form carboxyhemoglobin (COHb). This compound interferes with the life-sustaining transfer of oxygen from the lungs to the body tissues, and the return of carbon dioxide from the tissues to the lungs. The presence of relatively small amounts of CO results in significant interference with essential cardio-vascular-respiratory functions. Brief exposure to high levels of CO can impair vision, physical coordination, and the perception of time.

NAAQS for CO have been set by the U.S. Environmental Protection Agency (EPA). Standards for the Commonwealth of Massachusetts are identical to federal standards. The standards, intended to protect the public health, set a maximum concentration of 35 parts per million (ppm) for a 1-hour period and 9 ppm for 8 hours, each not to be exceeded more than once per year. The target date for attainment of national CO standards in Massachusetts is December 31, 1987.

■ Background Air Quality

In urban areas such as Boston there is always present in the air a fairly constant and diffuse level of CO due to the numerous sources spread throughout the City and beyond. Such sources include all stationary fuel combustion facilities, as well as motor vehicle emissions on urban roadways. This diffuse level of air pollution is called the background level.

Background air quality can be determined by monitoring and testing air samples; however, no state monitoring station exists near the site. Background levels of CO for 1985 in the study area have been estimated by the Massachusetts Department of Environmental Quality Engineering (DEQE) to be 3.0 ppm (1-hour average) and 1.5 ppm (8-hour average).[1] It is necessary to estimate a value for the background CO level in this study since it is added to the impacts of local sources (i.e., roadway intersections in the traffic study area, and ventilation air emitted by project parking garage exhaust ducts) in determining whether air quality at a particular location complies with the NAAQS.

■ Methodology for Estimating Air Quality

The technical approach used to predict ambient air quality was approved in advance by the Massachusetts DEQE.[1] The analysis calculated maximum 1-hour and 8-hour CO concentrations at sensitive receptors near 19 intersections in the project area for the following seven cases:

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[1] Personal communication, Mr. Tom DeNormandie, Massachusetts Division of Air Quality Control, DEQE, Boston, MA, August 9 and 28, 1985.

Case No.	Year	Development Alternative	Third Harbor Crossing
1	1985	Existing Conditions	Without
2	1990	No-Build	Without
3	1990	Partial Build	Without
4	1995	No-Build	Without
5	1995	Build	Without
6	1995	No-Build	With
7	1995	Build	With

The 19 intersections were selected because using worst case assumptions and in the absence of traffic mitigation, the traffic analysis indicated that their 1995 Build (without Third Harbor Tunnel) level of service will be "E", or the level of service will be "D" and the developments will add 10 percent or more to peak hour No-Build volumes. The set of intersections analyzed in detail were:

- East Broadway/L Street
- West Broadway/D Street
- Old Colony Ave./D Street
- West Broadway/A Street
- West Fourth Street/Frontage Road
- Summer Street/Viaduct Street
- Summer Street/Atlantic Ave.
- Northern Ave./Atlantic Ave.
- Congress Street/Atlantic Ave.
- Summer Street/D Street
- Atlantic Ave./High Street/Surface Artery
- Northern Ave./Ramp Street
- Day Boulevard/L Street
- New Northern Ave./Sleeper Street
- New Northern Ave./Pittsburgh Street
- New Northern Ave./Seaport Access Road Entrance
- New Northern Ave./Seaport Access Road Exit
- West Broadway/Dorchester Ave.
- Columbia Circle

This analysis examines the air quality effects of the Initial Proposal Master Plans for Fan Pier and Pier 4 because these represent the worst case scenarios in terms of vehicular traffic generation.

Two mathematical models were used to predict air quality concentrations and their effects. The first, MOBILE-3,[1] was used to calculate the emissions of CO at intersections based on traffic flow. The second model, CALINE-3,[1] was used to predict concentrations of CO at sensitive receptors near the intersections. A detailed description of the technical approach and receptor locations is given in the Air Quality Appendix. Figure IV.2-1 indicates the roadway intersections studied in this analysis.

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[1] EPA, User's Guide to MOBILE-3 (Mobile Source Emissions Model), EPA-460/3-84-002, Ann Arbor, MI, June 1984, including software corrections from EPA dated May, 1985.

A separate analysis of the impact of the proposed underground garage ventilation systems at both development sites was conducted for the 1995 Build case.[2] Worst case garage impacts were assessed for the Initial Proposal Master Plans for the Fan Pier and Pier 4.

These Initial Proposal Master Plans were assumed in the parking garage analysis. Maximum 1-hour and 8-hour concentrations were predicted using a dilution calculation and Halitsky's model for near-field receptors.[3] Details, including the location of sensitive receptors, are provided in the Air Quality Appendix.

PROBABLE PROJECT IMPACTS

The air quality analysis predicted maximum 1-hour and 8-hour CO concentrations at 60 sensitive receptors. Details of the analysis are included in the Air Quality Appendix.

■ Intersection Analysis

The cumulative results of the air quality analysis, including impacts from intersection traffic and background carbon monoxide, are presented in Tables IV.2-1 through IV.-2-7. Concentrations in excess of the standards are underlined in these tables. These results do not characterize typical air pollution levels in the project area. Rather, they represent the highest concentrations that could exist during the joint occurrence of worst case meteorology and peak traffic. Since no results are presented for the 1985 existing conditions (Case 1) at the four intersections along New Northern Avenue (because this roadway and the intersections do not now exist), only 15 intersections were studied for Case 1 while all 19 intersections were examined in Cases 2-7.

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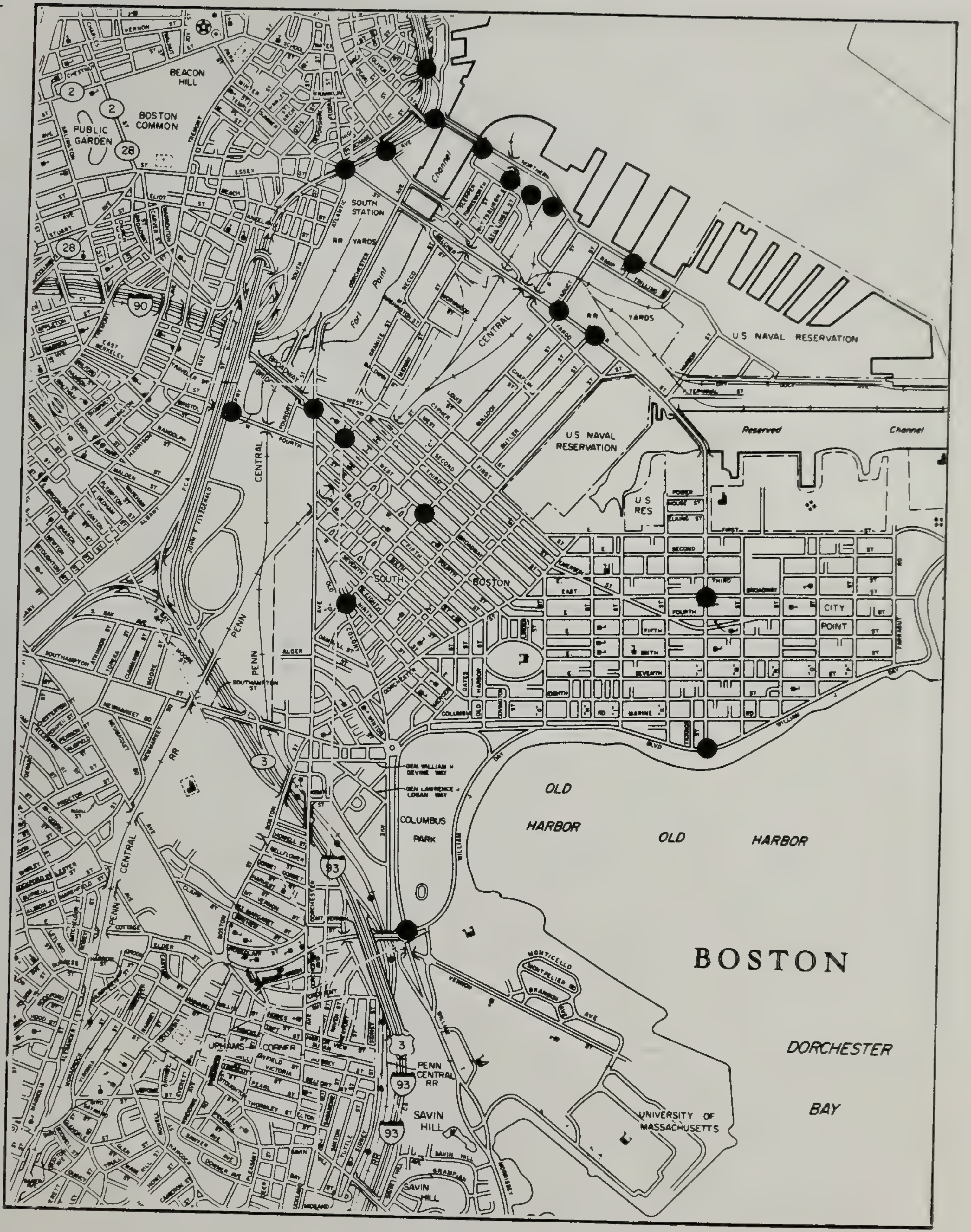
[1] California Department of Transportation, CALINE-3, A Versatile Dispersion Model for Predicting Air Pollutant Levels Near Highways and Arterial Streets, FHWA/CA/TL-79/23, Sacramento, CA, November, 1979.

[2] Parking garage impacts in 1995 are the same whether the Third Harbor Tunnel is built or not.

[3] Halitsky, J., "Gas Diffusion Near Buildings," Meteorology and Atomic Energy 1968, U.S. Department of Energy (NTIS TID-24190), 1968, pp. 246-252.

FIGURE IV.2-1
Intersections
Studied in
the Air
Quality
Analysis



Case 1 - Existing Conditions

The modeling results for Case 1 show maximum 1-hour CO concentrations in the range from 7.9 to 39.2 ppm. A violation of the 1-hour NAAQS (35 ppm) is predicted for the intersection of Northern Avenue and Atlantic Avenue (39.2 ppm). Maximum 8-hour CO levels for the intersections studied range from 3.1 to 16.2 ppm. Violations of the 8-hour NAAQS (9 ppm) are predicted at three locations: Northern Avenue and Atlantic Avenue (16.2 ppm), Congress Street and Atlantic Avenue (9.2 ppm), and High Street and Atlantic Avenue (12.0 ppm). Maximum 8-hour CO levels are also close to the NAAQS at the intersections of West Fourth Street and Frontage Road (8.4 ppm) and Summer Street and Atlantic Avenue (8.1 ppm).

Case 2 - 1990 No-Build

The modeling results for Case 2 show a significant improvement in air quality due to the predicted decrease in the average motor vehicle emission rate. The average emission rate decreases with time as a larger portion of the vehicle population becomes equipped with full emission control equipment, and a larger portion of the vehicle population is held to stricter emission limits through the Commonwealth's Inspection and Maintenance Program. As discussed in the Air Quality Appendix, the benefits of emission rate reduction outweigh the negative effects of increasing traffic volumes from 1985 to 1990 and 1995. Air quality at the Northern Avenue and Atlantic Avenue intersection also improves because of the Commonwealth's plan to relocate and signalize this intersection.

For the 1990 No-Build case, all 1-hour and 8-hour CO concentrations are in compliance with the NAAQS. Maximum 1-hour values range from 5.5 to 18.8 ppm, while 8-hour values run from 2.0 to 6.9 ppm.

Case 3 - 1990 Partial Build

The predicted CO concentrations for Case 3 are all in compliance with the NAAQS. Maximum 1-hour CO levels range from 5.6 to 19.4 ppm, while 8-hour values run from 2.2 to 7.2 ppm. The Fan Pier and Pier 4 projects add over 0.5 ppm to maximum 8-hour CO concentrations at the following two intersections:

- East Broadway and L Street (adds 0.6 ppm for a total of 3.4 ppm)
- New Northern Avenue and Seaport Access Road Entrance (adds 1.3 ppm for a total of 6.1 ppm)

Even with these increases, total CO concentrations are safely in compliance with the NAAQS.

Case 4 - 1995 No-Build without Third Harbor Crossing

Air quality in 1995 under the No-Build without Third Harbor Tunnel case shows further improvement from 1990 No-Build levels for the same reasons outlined in the discussion of Case 2. All CO concentrations remain in compliance with the NAAQS. Maximum 1-hour levels range from 4.7 to 14.7 ppm, while 8-hour levels run from 1.8 to 5.4 ppm.

Case 5 - 1995 Build without Third Harbor Crossing

The predicted CO concentrations for Case 5 are all in compliance with the NAAQS. Maximum 1-hour levels range from 4.8 to 15.6 ppm, while 8-hour values range from 1.9 to 5.8 ppm. The Fan Pier and Pier 4 projects add over 0.5 ppm to maximum 8-hour CO concentrations at the following four intersections:

- Summer Street and Viaduct Street (adds 0.9 ppm for a total of 4.1 ppm)
- Summer Street and Atlantic Avenue (adds 1.2 ppm for a total of 4.5 ppm)
- New Northern Avenue and Sleeper Street (adds 1.0 ppm for a total of 3.7 ppm)
- New Northern Avenue and Seaport Access Road Entrance (adds 1.6 ppm for a total of 4.4 ppm)

Case 6 - 1995 No-Build with Third Harbor Crossing

Construction of the Third Harbor Crossing will reduce traffic volumes at many intersections and for this reason will further improve air quality in 1995 for the No-Build case. All CO concentrations remain in compliance with the NAAQS. Maximum 1-hour levels range from 4.3 to 13.4 ppm, while 8-hour levels run from 1.7 to 4.6 ppm.

Case 7 - 1995 Build with Third Harbor Crossing

The predicted CO concentrations for Case 7 are all in compliance with the NAAQS. Maximum 1-hour levels range from 4.3 to 14.7 ppm, while 8-hour values range from 1.7 to 5.4 ppm. The Fan Pier and Pier 4 projects add over 0.5 ppm to maximum 8-hour CO concentrations at the following four intersections (when compared to Case 6 - 1995 No-Build with Third Harbor Crossing):

- Congress Street and Atlantic Avenue (adds 0.8 ppm for a total of 5.4 ppm)
- New Northern Avenue and Sleeper Street (adds 0.7 ppm for a total of 3.0 ppm)

- New Northern Avenue and Seaport Access Road Entrance (adds 0.9 ppm for a total of 4.1 ppm)
- New Northern Avenue and Seaport Access Road Exit (adds 0.8 ppm for a total of 4.2 ppm)

When the predicted CO levels for Case 7 (1995 Build with Third Harbor Crossing) and Case 5 (1995 Build without Third Harbor Crossing) are compared, the Third Harbor Crossing is seen to be a significant, and far-reaching, mitigating measure for air quality impacts. The Third Harbor Crossing will reduce maximum 8-hour CO concentrations by 0.5 ppm or more at the following 12 intersections:

- West Broadway and D Street (-0.8 ppm)
- Old Colony Avenue and D Street (-0.5 ppm)
- West Broadway and A Street (-0.7 ppm)
- West Fourth Street and Frontage Road (-2.0 ppm)
- Summer Street and Viaduct Street (-1.5 ppm)
- Summer Street and Atlantic Avenue (-1.3 ppm)
- Northern Avenue and Atlantic Avenue (-0.9 ppm)
- Summer Street and D Street (-0.8 ppm)
- High Street and Atlantic Avenue (-3.5 ppm)
- New Northern Avenue and Sleeper Street (-0.7 ppm)
- New Northern Avenue and Pittsburgh Street (-1.0 ppm)
- New Northern Avenue and Seaport Access Road Entrance (-1.1 ppm)

At the four intersections in Case 5 (1995 Build without Third Harbor Crossing) where project impacts are the greatest, the Third Harbor Crossing mitigates all or most of the increase in CO concentrations.

Summary of Intersection Analysis

Maximum 1-hour and 8-hour CO concentrations are currently in violation of the NAAQS at three intersections along Atlantic Avenue in Boston. Predicted air quality levels in 1990 and 1995 show all intersections will be in compliance with the NAAQS for both the Build and No-Build cases. Thus, it can be concluded that the Fan Pier and Pier 4 projects will not interfere with the attainment or maintenance of the NAAQS for CO.

Project impacts are greatest in 1995 without the Third Harbor Crossing at the following four intersections:

- Summer Street and Viaduct Street
- Summer Street and Atlantic Avenue
- New Northern Avenue and Sleeper Street
- New Northern Avenue and Seaport Access Road Entrance

Construction of the Third Harbor Crossing will mitigate all of the impacts at the two intersections on Summer Street, and will mitigate most of the project impact at the other two intersections along New Northern Avenue. Without the Third Harbor Crossing, additional mitigation measures are recommended.

TABLE IV.2-1
Predicted Maximum CO Concentrations Plus Background at 19 Project Area Intersections for Case 1: 1985 Existing Conditions without Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm)	
	1-Hour	8-Hour
East Broadway/L Street		
Residence #748 Broadway	12.1	4.0
Residence #754 Broadway	12.6	4.6
Trinity Florist	14.5	4.5
Cox Electric Co.	16.3	5.1
West Broadway/D Street		
Burger King	9.3	3.5
Arco Gas Station	8.2	3.2
Broadway Pharmacy	13.4	4.7
Residence #209 Broadway	10.1	3.8
Old Colony Ave./D Street		
Residence #104 D Street	16.6	6.1
Mike Kiley's Bar	17.6	6.3
Merit Gas Station	13.3	4.5
West Broadway/A Street		
Cardinal Cushing High School	11.0	4.6
Amrhein's Restaurant	12.9	5.3
Exxon Gas Station	10.4	4.3
Mul's Restaurant	11.9	5.2
West Fourth St./Frontage Rd.		
N.E. Corner	27.3	8.4
S.E. Corner	21.2	6.6
Summer Street/Viaduct Street		
Noymer Co.	18.0	6.6
Wardrobe Maker, Inc.	9.1	3.5
Araban Coffee Co.	13.6	5.1
Summer St./Atlantic Ave.		
Dewey Sq. Park	15.0	5.2
MBTA Entrance	21.0	8.1
South Station	16.0	5.7
One Financial Center	14.8	5.3
Northern Ave./Atlantic Ave		
GSA Office Building	39.2	16.2
James Hook Lobster Co.	17.4	6.9
Congress St./Atlantic Ave.		
IFR Furniture Rentals	21.4	7.8
Federal Reserve Bank	24.5	9.2
Trailways Bus Terminal	20.6	7.2

TABLE IV.2-1
(Cont'd.)
Predicted Maximum CO Concentrations Plus Background at 19 Project Area Intersections for Case 1: 1985 Existing Conditions without Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm)	
	1-Hour	8-Hour
Summer Street/D Street		
Spencer Shoe Corp.	13.6	4.5
Barnes Building	20.7	7.3
S.W. Corner	16.5	5.7
High St./Atlantic Ave./Surface Artery		
The Ultimate Deli	21.3	7.4
Park - N.E. Corner	31.9	12.0
Rowes Wharf	18.6	6.9
International Place	19.8	6.5
Northern Ave./Ramp Street		
Boston Fish Pier	13.9	4.7
Shawmut Bank	7.9	3.1
Pier Transmission, Inc.	9.7	3.6
Day Blvd./L Street		
Residence #1662 Columbia Rd.	12.5	4.4
Residence #244 L Street	10.5	3.7
James Curley Recreation Center	14.0	3.9
New Northern Ave./Sleeper St.		
N.W. Corner	N/A	N/A
N.E. Corner	N/A	N/A
S.W. Corner	N/A	N/A
New Northern Ave./Pittsburgh St.		
N.E. Corner	N/A	N/A
S.E. Corner	N/A	N/A
S.W. Corner	N/A	N/A
New Northern Ave./Seaport Access Rd. Entrance		
N.W. Corner	N/A	N/A
N.E. Corner	N/A	N/A
S.W. Corner	N/A	N/A
New Northern Ave./Seaport Access Rd. Exit		
N.E. Corner	N/A	N/A
S.E. Corner	N/A	N/A
S.W. Corner	N/A	N/A
West Broadway/Dorchester Ave.		
The Cornerstone Restaurant	18.6	6.8
Quiet Man's Pub	17.1	6.1
Cronin's Pub	13.6	4.9
Columbia Circle		
Walkway to MBTA	11.8	4.2
Saunders Park - North	13.8	5.4
Saunders Park - South	13.2	5.3

TABLE IV.2-2
Predicted Maximum CO Concentrations Plus Background at 19 Project Area Intersections for Case 2: 1990 No-Build, without Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm) 1-Hour	CO Concentration (ppm) 8-Hour
East Broadway/L Street		
Residence #748 Broadway	7.7	2.6
Residence #754 Broadway	8.0	2.9
Trinity Florist	8.8	2.8
Cox Electric Co.	9.8	3.2
West Broadway/D Street		
Burger King	6.2	2.5
Arco Gas Station	5.5	2.2
Broadway Pharmacy	10.0	3.4
Residence #209 Broadway	7.1	2.7
Old Colony Ave./D Street		
Residence #104 D Street	10.4	3.8
Mike Kiley's Bar	11.3	4.0
Merit Gas Station	8.7	2.9
West Broadway/A Street		
Cardinal Cushing High School	6.9	2.7
Amrhein's Restaurant	8.0	3.0
Exxon Gas Station	6.3	2.5
Mul's Restaurant	7.7	2.9
West Fourth St./Frontage Rd.		
N.E. Corner	16.4	5.0
S.E. Corner	13.4	4.0
Summer Street/Viaduct Street		
Noymer Co.	11.4	4.1
Wardrobe Maker, Inc.	6.4	2.4
Araban Coffee Co.	9.6	3.5
Summer St./Atlantic Ave.		
Dewey Sq. Park	15.0	4.6
MBTA Entrance	18.1	5.9
South Station	10.3	4.0
One Financial Center	9.3	3.8
Northern Ave./Atlantic Ave		
GSA Office Building	10.0	3.9
James Hook Lobster Co.	13.2	5.1
Congress St./Atlantic Ave.		
IFR Furniture Rentals	14.5	5.1
Federal Reserve Bank	17.1	6.0
Trailways Bus Terminal	13.2	4.8

TABLE IV.2-2 (Cont'd.)
Predicted Maximum CO Concentrations Plus Background at 19 Project Area Intersections for Case 2: 1990 No-Build, without Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm)	
	1-Hour	8-Hour
Summer Street/D Street		
Spencer Shoe Corp.	9.0	3.0
Barnes Building	12.5	4.9
S.W. Corner	10.5	3.7
High St./Atlantic Ave./Surface Artery		
The Ultimate Deli	12.7	4.4
Park - N.E. Corner	18.8	6.9
Rowes Wharf	11.5	4.4
International Place	12.2	4.0
Northern Ave./Ramp Street		
Boston Fish Pier	9.0	3.4
Shawmut Bank	6.3	3.2
Pier Transmission, Inc.	6.4	2.5
Day Blvd./L Street		
Residence #1662 Columbia Rd.	7.7	3.2
Residence #244 L Street	6.6	2.7
James Curley Recreation Center	9.3	3.3
New Northern Ave./Sleeper St.		
N.W. Corner	8.1	3.1
N.E. Corner	11.3	3.9
S.W. Corner	8.5	3.0
New Northern Ave./Pittsburgh St.		
N.E. Corner	17.0	6.1
S.E. Corner	14.7	5.2
S.W. Corner	15.2	5.2
New Northern Ave./Seaport Access Rd. Entrance		
N.W. Corner	11.9	4.7
N.E. Corner	12.3	4.8
S.W. Corner	7.3	2.8
New Northern Ave./Seaport Access Rd. Exit		
N.E. Corner	6.9	2.3
S.E. Corner	6.1	2.0
S.W. Corner	6.3	2.1
West Broadway/Dorchester Ave.		
The Cornerstone Restaurant	11.1	4.1
Quiet Man's Pub	10.3	3.7
Cronin's Pub	8.3	3.0
Columbia Circle		
Walkway to MBTA	7.9	2.8
Saunders Park - North	8.5	3.3
Saunders Park - South	8.1	3.2

TABLE IV.2-3
Predicted Maximum CO Concentrations Plus Background at 19 Project Area Intersections for Case 3: 1990 Partial Build, without Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm) 1-Hour	8-Hour
East Broadway/L Street		
Residence #748 Broadway	7.9	2.6
Residence #754 Broadway	8.3	3.2
Trinity Florist	9.0	3.4
Cox Electric Co.	10.2	3.4
West Broadway/D Street		
Burger King	6.4	2.5
Arco Gas Station	5.6	2.3
Broadway Pharmacy	10.4	3.7
Residence #209 Broadway	7.4	2.8
Old Colony Ave./D Street		
Residence #104 D Street	10.8	3.8
Mike Kiley's Bar	11.9	4.0
Merit Gas Station	9.1	3.0
West Broadway/A Street		
Cardinal Cushing High School	7.2	2.7
Amrhein's Restaurant	8.8	3.2
Exxon Gas Station	7.2	2.5
Mul's Restaurant	8.7	3.1
West Fourth St./Frontage Rd.		
N.E. Corner	16.7	5.0
S.E. Corner	13.7	4.1
Summer Street/Viaduct Street		
Noymer Co.	11.8	4.2
Wardrobe Maker, Inc.	6.9	2.5
Araban Coffee Co.	11.1	3.7
Summer St./Atlantic Ave.		
Dewey Sq. Park	14.7	4.5
MBTA Entrance	17.7	5.6
South Station	10.2	4.1
One Financial Center	9.2	3.8
Northern Ave./Atlantic Ave		
GSA Office Building	10.1	3.9
James Hook Lobster Co.	13.3	5.2
Congress St./Atlantic Ave.		
IFR Furniture Rentals	14.6	5.1
Federal Reserve Bank	17.8	6.0
Trailways Bus Terminal	13.3	4.9

TABLE IV.2-3
(Cont'.d)
Predicted Maximum
CO Concentrations
Plus Background at
Intersections for
Case 3: 1990
Partial Build,
without Third
Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm) 1-Hour	8-Hour
Summer Street/D Street		
Spencer Shoe Corp.	9.3	3.1
Barnes Building	12.7	4.9
S.W. Corner	10.7	3.8
High St./Atlantic Ave./Surface Artery		
The Ultimate Deli	12.9	4.5
Park - N.E. Corner	19.4	7.2
Rowes Wharf	11.7	4.4
International Place	12.3	4.0
Northern Ave./Ramp Street		
Boston Fish Pier	9.5	3.5
Shawmut Bank	6.9	2.4
Pier Transmission, Inc.	6.8	2.5
Day Blvd./L Street		
Residence #1662 Columbia Rd.	7.6	3.1
Residence #244 L Street	6.5	2.6
James Curley Recreation Center	8.8	3.2
New Northern Ave./Sleeper St.		
N.W. Corner	9.9	3.4
N.E. Corner	12.2	4.2
S.W. Corner	10.6	3.5
New Northern Ave./Pittsburgh St.		
N.E. Corner	16.5	5.9
S.E. Corner	13.9	4.9
S.W. Corner	15.0	5.0
New Northern Ave./Seaport Access Rd. Entrance		
N.W. Corner	13.9	5.6
N.E. Corner	14.9	6.1
S.W. Corner	8.8	3.3
New Northern Ave./Seaport Access Rd. Exit		
N.E. Corner	7.5	2.5
S.E. Corner	6.6	2.2
S.W. Corner	6.8	2.3
West Broadway/Dorchester Ave.		
The Cornerstone Restaurant	11.1	4.1
Quiet Man's Pub	10.5	3.8
Cronin's Pub	8.3	3.0
Columbia Circle		
Walkway to MBTA	8.3	2.8
Saunders Park - North	8.7	3.3
Saunders Park - South	8.3	3.3

TABLE IV.2-4
Predicted Maximum CO Concentrations Plus Background at 19 Project Area Intersections for Case 4: 1995 No-Build, without Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm)	
	1-Hour	8-Hour
East Broadway/L Street		
Residence #748 Broadway	6.2	2.1
Residence #754 Broadway	6.6	2.5
Trinity Florist	7.0	2.7
Cox Electric Co.	8.0	2.7
West Broadway/D Street		
Burger King	5.3	2.0
Arco Gas Station	4.7	1.8
Broadway Pharmacy	8.3	3.0
Residence #209 Broadway	5.8	2.3
Old Colony Ave./D Street		
Residence #104 D Street	8.3	3.1
Mike Kiley's Bar	9.2	3.2
Merit Gas Station	7.1	2.5
West Broadway/A Street		
Cardinal Cushing High School	6.0	2.3
Amrhein's Restaurant	7.0	2.5
Exxon Gas Station	6.0	2.1
Mul's Restaurant	7.0	2.5
West Fourth St./Frontage Rd.		
N.E. Corner	12.7	3.8
S.E. Corner	10.7	3.1
Summer Street/Viaduct Street		
Noymer Co.	9.1	3.4
Wardrobe Maker, Inc.	5.6	2.1
Araban Coffee Co.	10.2	3.2
Summer St./Atlantic Ave.		
Dewey Sq. Park	12.4	3.3
MBTA Entrance	14.4	4.2
South Station	8.1	3.1
One Financial Center	7.5	2.8
Northern Ave./Atlantic Ave		
GSA Office Building	7.6	3.0
James Hook Lobster Co.	9.8	3.9
Congress St./Atlantic Ave.		
IFR Furniture Rentals	12.3	4.2
Federal Reserve Bank	14.7	5.3
Trailways Bus Terminal	10.3	4.0

TABLE IV.2-4
(Cont'd.)
Predicted Maximum
CO Concentrations
Plus Background at
19 Project Area
Intersections for
Case 4: 1995
No-Build, without
Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm) 1-Hour	8-Hour
Summer Street/D Street		
Spencer Shoe Corp.	8.1	2.8
Barnes Building	10.0	3.8
S.W. Corner	9.0	3.1
High St./Atlantic Ave./Surface Artery		
The Ultimate Deli	10.8	3.3
Park - N.E. Corner	14.2	5.4
Rowes Wharf	9.1	3.3
International Place	11.1	3.2
Northern Ave./Ramp Street		
Boston Fish Pier	7.8	2.9
Shawmut Bank	5.3	2.1
Pier Transmission, Inc.	5.8	2.2
Day Blvd./L Street		
Residence #1662 Columbia Rd.	6.2	2.5
Residence #244 L Street	5.4	2.2
James Curley Recreation Center	7.7	2.8
New Northern Ave./Sleeper St.		
N.W. Corner	8.9	3.0
N.E. Corner	10.4	3.4
S.W. Corner	8.2	2.7
New Northern Ave./Pittsburgh St.		
N.E. Corner	12.5	4.4
S.E. Corner	12.8	4.5
S.W. Corner	11.5	4.1
New Northern Ave./Seaport Access Rd. Entrance		
N.W. Corner	11.9	4.4
N.E. Corner	11.9	4.7
S.W. Corner	7.5	2.8
New Northern Ave./Seaport Access Rd. Exit		
N.E. Corner	7.5	2.4
S.E. Corner	6.5	2.1
S.W. Corner	6.6	2.2
West Broadway/Dorchester Ave.		
The Cornerstone Restaurant	8.3	3.1
Quiet Man's Pub	8.2	3.0
Cronin's Pub	6.5	2.4
Columbia Circle		
Walkway to MBTA	6.7	2.3
Saunders Park - North	6.8	2.5
Saunders Park - South	6.5	2.6

TABLE IV.2-5
Predicted Maximum CO Concentrations Plus Background at 19 Project Area Intersections for Case 5: 1995 Build, without Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm) 1-Hour	CO Concentration (ppm) 8-Hour
East Broadway/L Street		
Residence #748 Broadway	6.5	2.2
Residence #754 Broadway	7.0	2.6
Trinity Florist	7.4	2.8
Cox Electric Co.	8.5	2.8
West Broadway/D Street		
Burger King	5.4	2.0
Arco Gas Station	4.8	1.9
Broadway Pharmacy	8.8	3.1
Residence #209 Broadway	6.0	2.3
Old Colony Ave./D Street		
Residence #104 D Street	8.8	3.3
Mike Kiley's Bar	10.2	3.4
Merit Gas Station	7.5	2.8
West Broadway/A Street		
Cardinal Cushing High School	6.2	2.4
Amrhein's Restaurant	7.8	2.7
Exxon Gas Station	6.4	2.4
Mul's Restaurant	7.5	2.9
West Fourth St./Frontage Rd.		
N.E. Corner	13.0	3.8
S.E. Corner	11.1	3.1
Summer Street/Viaduct Street		
Noymer Co.	9.8	3.8
Wardrobe Maker, Inc.	5.8	2.2
Araban Coffee Co.	11.4	4.1
Summer St./Atlantic Ave.		
Dewey Sq. Park	13.0	4.5
MBTA Entrance	15.1	5.3
South Station	8.6	3.1
One Financial Center	7.6	2.9
Northern Ave./Atlantic Ave		
GSA Office Building	7.8	3.0
James Hook Lobster Co.	10.5	4.0
Congress St./Atlantic Ave.		
IFR Furniture Rentals	15.2	4.5
Federal Reserve Bank	15.6	5.6
Trailways Bus Terminal	10.7	4.1

TABLE IV.2-5
(Cont'd.)
Predicted Maximum CO Concentrations Plus Background at 19 Project Area Intersections for Case 5: 1995 Build without Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm) 1-Hour	8-Hour
Summer Street/D Street		
Spencer Shoe Corp.	8.6	2.9
Barnes Building	10.5	4.0
S.W. Corner	9.4	3.2
High St./Atlantic Ave./Surface Artery		
The Ultimate Deli	11.0	3.5
Park - N.E. Corner	14.9	5.7
Rowes Wharf	9.4	3.3
International Place	11.2	3.2
Northern Ave./Ramp Street		
Boston Fish Pier	8.5	3.1
Shawmut Bank	7.0	2.2
Pier Transmission, Inc.	6.4	2.3
Day Blvd./L Street		
Residence #1662 Columbia Rd.	6.7	2.6
Residence #244 L Street	5.7	2.3
James Curley Recreation Center	8.4	2.9
New Northern Ave./Sleeper St.		
N.W. Corner	11.0	3.5
N.E. Corner	12.5	3.9
S.W. Corner	11.1	3.7
New Northern Ave./Pittsburgh St.		
N.E. Corner	14.4	4.9
S.E. Corner	14.4	5.0
S.W. Corner	13.9	4.4
New Northern Ave./Seaport Access Rd. Entrance		
N.W. Corner	13.2	5.0
N.E. Corner	15.0	5.8
S.W. Corner	13.7	4.4
New Northern Ave./Seaport Access Rd. Exit		
N.E. Corner	8.6	2.7
S.E. Corner	7.3	2.3
S.W. Corner	7.5	2.4
West Broadway/Dorchester Ave.		
The Cornerstone Restaurant	8.4	3.2
Quiet Man's Pub	8.2	3.0
Cronin's Pub	6.5	2.4
Columbia Circle		
Walkway to MBTA	7.2	2.5
Saunders Park - North	7.1	2.6
Saunders Park - South	6.9	2.7

TABLE IV.2-6
Predicted Maximum CO Concentrations Plus Background at 19 Project Area Intersections for Case 6: 1995 No-Build, with Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm)	
	1-Hour	8-Hour
East Broadway/L Street		
Residence #748 Broadway	5.8	2.3
Residence #754 Broadway	6.1	2.2
Trinity Florist	6.6	2.5
Cox Electric Co.	7.3	2.9
West Broadway/D Street		
Burger King	4.6	1.8
Arco Gas Station	4.3	1.7
Broadway Pharmacy	6.3	2.2
Residence #209 Broadway	4.8	1.9
Old Colony Ave./D Street		
Residence #104 D Street	7.7	2.9
Mike Kiley's Bar	8.2	3.1
Merit Gas Station	6.2	2.3
West Broadway/A Street		
Cardinal Cushing High School	5.1	2.0
Amrhein's Restaurant	5.7	2.2
Exxon Gas Station	4.7	2.0
Mul's Restaurant	5.4	2.1
West Fourth St./Frontage Rd.		
N.E. Corner	5.3	1.8
S.E. Corner	5.6	1.9
Summer Street/Viaduct Street		
Noymer Co.	8.3	3.1
Wardrobe Maker, Inc.	4.9	1.9
Araban Coffee Co.	6.9	2.6
Summer St./Atlantic Ave.		
Dewey Sq. Park	9.2	3.2
MBTA Entrance	11.0	4.0
South Station	7.3	3.0
One Financial Center	7.4	3.0
Northern Ave./Atlantic Ave		
GSA Office Building	6.3	2.3
James Hook Lobster Co.	8.6	3.1
Congress St./Atlantic Ave.		
IFR Furniture Rentals	11.0	3.8
Federal Reserve Bank	13.4	4.6
Trailways Bus Terminal	10.0	3.8

TABLE IV.2-6
(Cont'd.)
Predicted Maximum
CO Concentrations
Plus Background at
19 Project Area
Intersections for
Case 6: 1995
No-Build, with
Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm)	
	1-Hour	8-Hour
Summer Street/D Street		
Spencer Shoe Corp.	6.7	2.3
Barnes Building	8.0	3.2
S.W. Corner	7.3	2.7
High St./Atlantic Ave./Surface Artery		
The Ultimate Deli	7.4	2.5
Park - N.E. Corner	6.4	2.2
Rowes Wharf	9.2	2.2
International Place	8.8	2.7
Northern Ave./Ramp Street		
Boston Fish Pier	7.5	2.9
Shawmut Bank	6.0	2.0
Pier Transmission, Inc.	5.6	2.1
Day Blvd./L Street		
Residence #1662 Columbia Rd.	5.8	2.2
Residence #244 L Street	5.0	1.9
James Curley Recreation Center	7.0	2.2
New Northern Ave./Sleeper St.		
N.W. Corner	6.8	2.6
N.E. Corner	8.7	3.0
S.W. Corner	6.5	2.3
New Northern Ave./Pittsburgh St.		
N.E. Corner	10.2	4.0
S.E. Corner	9.9	3.7
S.W. Corner	9.3	3.4
New Northern Ave./Seaport Access Rd. Entrance		
N.W. Corner	13.2	4.6
N.E. Corner	11.5	4.2
S.W. Corner	9.3	3.2
New Northern Ave./Seaport Access Rd. Exit		
N.E. Corner	10.0	3.4
S.E. Corner	11.5	4.6
S.W. Corner	11.3	4.2
West Broadway/Dorchester Ave.		
The Cornerstone Restaurant	8.2	3.1
Quiet Man's Pub	6.9	2.8
Cronin's Pub	6.3	2.4
Columbia Circle		
Walkway to MBTA	5.7	2.1
Saunders Park - North	6.3	2.5
Saunders Park - South	6.0	2.5

TABLE IV.2-7
Predicted Maximum CO Concentrations Plus Background at 19 Project Area Intersections for Case 7: 1995 Build, with Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm)	
	1-Hour	8-Hour
East Broadway/L Street		
Residence #748 Broadway	5.9	2.3
Residence #754 Broadway	6.2	2.3
Trinity Florist	6.7	2.5
Cox Electric Co.	7.5	2.9
West Broadway/D Street		
Burger King	4.6	1.8
Arco Gas Station	4.3	1.7
Broadway Pharmacy	6.3	2.3
Residence #209 Broadway	4.8	1.9
Old Colony Ave./D Street		
Residence #104 D Street	7.6	3.0
Mike Kiley's Bar	8.3	3.1
Merit Gas Station	6.2	2.3
West Broadway/A Street		
Cardinal Cushing High School	5.1	2.0
Amrhein's Restaurant	5.8	2.2
Exxon Gas Station	4.8	2.0
Mul's Restaurant	5.7	2.2
West Fourth St./Frontage Rd.		
N.E. Corner	5.3	1.8
S.E. Corner	5.6	1.9
Summer Street/Viaduct Street		
Noymer Co.	8.5	3.2
Wardrobe Maker, Inc.	5.1	1.9
Araban Coffee Co.	7.3	2.6
Summer St./Atlantic Ave.		
Dewey Sq. Park	9.4	3.2
MBTA Entrance	11.4	4.1
South Station	7.4	3.0
One Financial Center	7.4	3.0
Northern Ave./Atlantic Ave		
GSA Office Building	6.5	2.3
James Hook Lobster Co.	8.9	3.1
Congress St./Atlantic Ave.		
IFR Furniture Rentals	12.1	4.1
Federal Reserve Bank	14.6	5.4
Trailways Bus Terminal	10.4	3.9

TABLE IV.2-7
(Cont'd.)
Predicted Maximum CO Concentrations Plus Background at 19 Project Area Intersections for Case 7: 1995 Build, with Third Harbor Tunnel

Intersection and Receptor Location	CO Concentration (ppm) 1-Hour	CO Concentration (ppm) 8-Hour
Summer Street/D Street		
Spencer Shoe Corp.	6.8	2.3
Barnes Building	8.2	3.2
S.W. Corner	7.5	2.8
High St./Atlantic Ave./Surface Artery		
The Ultimate Deli	7.4	2.5
Park - N.E. Corner	6.4	2.2
Rowes Wharf	9.2	2.2
International Place	7.8	2.7
Northern Ave./Ramp Street		
Boston Fish Pier	6.6	2.9
Shawmut Bank	6.2	2.1
Pier Transmission, Inc.	5.8	2.1
Day Blvd./L Street		
Residence #1662 Columbia Rd.	5.9	2.5
Residence #244 L Street	5.0	2.1
James Curley Recreation Center	7.1	2.7
New Northern Ave./Sleeper St.		
N.W. Corner	7.6	2.8
N.E. Corner	9.6	3.3
S.W. Corner	8.1	3.0
New Northern Ave./Pittsburgh St.		
N.E. Corner	11.1	4.1
S.E. Corner	10.8	4.0
S.W. Corner	9.9	3.6
New Northern Ave./Seaport Access Rd. Entrance		
N.W. Corner	14.7	5.0
N.E. Corner	13.2	4.7
S.W. Corner	12.8	4.1
New Northern Ave./Seaport Access Rd. Exit		
N.E. Corner	13.8	4.2
S.E. Corner	13.5	4.8
S.W. Corner	13.0	4.6
West Broadway/Dorchester Ave.		
The Cornerstone Restaurant	8.2	3.1
Quiet Man's Pub	7.0	2.8
Cronin's Pub	6.3	2.4
Columbia Circle		
Walkway to MBTA	5.9	2.2
Saunders Park - North	6.4	2.5
Saunders Park - South	6.2	2.5

■ Fan Pier Parking Garage Analysis

An analysis of the impacts of the ventilation systems for the Fan Pier development underground garages was conducted for the 1995 Build cases. Maximum 1-hour and 8-hour CO concentrations were predicted at 13 sensitive receptors on the site , see Table IV.2-8. Background concentrations are accounted for in these estimates. The Initial Proposal garage design calls for four exhaust ducts for the Northern Avenue underground garage, two on either side of the Farnsworth Street and Pittsburgh Street bridges over the canal. The garage north of the canal will also have four exhaust ducts, spaced around the oval in front of the hotel entrance. Impacts were predicted for the pedestrian areas near the exhaust ducts, along Old Northern Avenue, and for the fresh air intake ducts for each building proposed for the Fan Pier development. Receptor locations are indicated by stars in Figure IV.2-2.

TABLE IV.2-8
Predicted Maximum CO Concentrations Plus Background at 13 Receptors Affected by the Fan Pier Parking Garage Ventilation System, for the 1995 Build Cases

	CO Concentration (ppm)	
Receptor Location	1-Hour	8-Hour
Pedestrian Areas		
-- Old Northern Avenue	4.8	2.1
-- Hotel Plaza	7.0	2.4
-- Farnsworth Street Bridge	6.9	2.8
-- Pittsburgh Street Bridge	8.3	3.1
Fresh Air Intakes		
-- Area A	4.3	1.8
-- Area B	4.9	2.0
-- Area C	6.7	2.7
-- Area D	4.3	1.8
-- Area E	4.1	1.8
-- Area F	6.7	2.6
-- Area G	4.9	2.0
-- Area H	6.1	2.3
-- Hotel	6.4	2.4

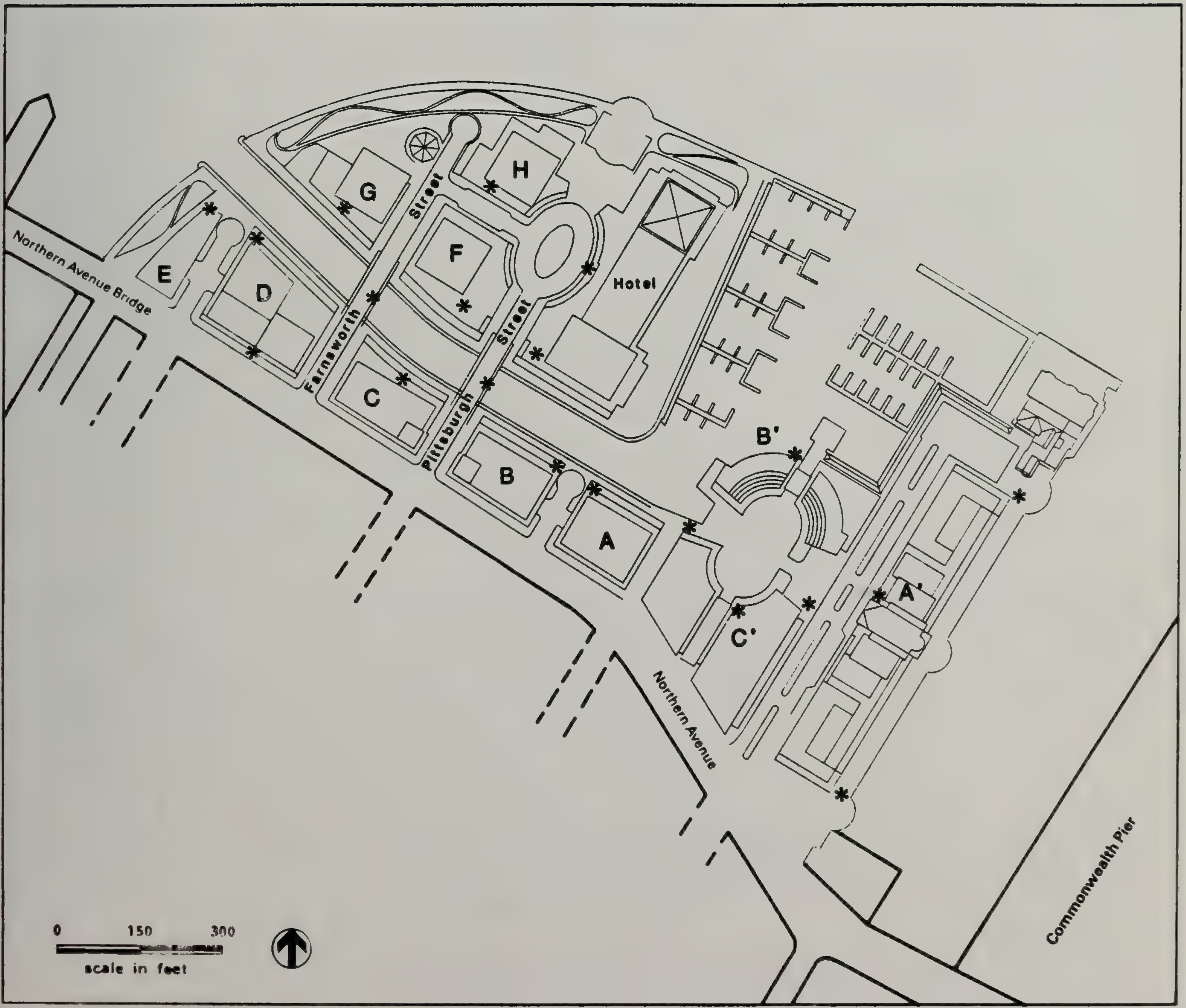
The modeling results show that worst case 1-hour CO concentrations from the Fan Pier garage ventilation air will range from 4.1 to 8.3 ppm at various sensitive receptors. These levels are less than 25 percent of the 1-hour NAAQS of 35 ppm. Worst-case 8-hour CO concentrations at the same receptors run from 1.8 to 3.1 ppm. These levels are less than 40 percent of the 8-hour NAAQS of 9 ppm. It can be concluded that emissions from the Fan Pier parking garages will not interfere with the attainment or maintenance of the NAAQS for CO in the project area.

■ Pier 4 Parking Garage Analysis

An analysis of the impacts of the ventilation systems for the Pier 4 development underground garages was conducted for the 1995 Build cases. Maximum 1-hour and 8-hour CO concentrations were predicted at eight sensitive receptors, see Table IV.2-9. Background concentrations

FIGURE IV.2-2

Air Quality Receptor Locations in the Fan Pier and Pier 4 Initial Proposal Master Plans



are accounted for in these estimates. The Initial Proposal garage design calls for two exhaust ducts for the east underground garage, at the northeast and southeast corners of Area A'. For the garage under the western half of the site, two ducts will also be used, located at the northeast and northwest corners of the Area C'. Impacts were predicted for the pedestrian areas near each exhaust duct, along Old Northern Avenue, and for the fresh air intake ducts for each building proposed for the Pier 4 development. Receptor locations are indicated by stars in Figure IV.2-2.

TABLE IV.2-9
Predicted Maximum CO Concentrations Plus Background at 8 Receptors Affected by the Pier 4 Parking Garage Ventilation System, for the 1995 Build Cases

	CO Concentration (ppm)	
Receptor Location	1-Hour	8-Hour
Pedestrian Areas		
--Old Northern Avenue	3.1	1.3
--Area A' NE Corner	4.0	1.5
--Area A' SE Corner	4.0	1.5
--Area C' NW Corner	4.0	1.5
--Area C' NE Corner	4.3	1.6
Fresh Air Intakes		
--Area A'	3.2	1.3
--Area B'	3.0	1.2
--Area C'	3.5	1.4

The modeling results show that worst-case 1-hour CO concentrations from the Pier 4 garage ventilation air will range from 3.0 to 4.3 ppm at various sensitive receptors. These levels are less than 15 percent of the 1-hour NAAQS of 35 ppm. Worst-case 8-hour CO concentrations at the same receptors run from 1.2 to 1.6 ppm. These levels are less than 20 percent of the 8-hour NAAQS of 9 ppm. It can be concluded that emissions from the Pier 4 parking garages will not interfere with the attainment or maintenance of the NAAQS for CO in the project area.

■ Construction Impacts

During the construction of the Fan Pier and Pier 4 developments, short-term air quality impacts will result from fugitive dust emissions. The major dust-emitting activities will occur during the construction phases involving demolition, excavation, and foundation work. The EPA has conservatively estimated an uncontrolled emission factor of 1.2 tons of suspended dust emissions monthly per acre of construction for heavy construction operations.[1] This value is based on field measurements of emissions from construction projects and applies to a climate with a Precipitation/Evaporation (PE) index of 50. Emissions are inversely proportional to the square of the PE index. A value of 0.17 tons per acre of construction per month was assumed for Boston utilizing the local PE index of 132. Applying this factor to the 24.8-acre development area (15.9 acres for Fan Pier and 8.9 acres for Pier 4) yields an estimate of 4.2 tons of fugitive dust per month for the entire development area, generated from construction activities. This is equivalent to an area source emissions rate of 0.000015 grams/second-square meter for the development area.

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[1] EPA, Compilation of Air Pollutant Emission Factors, AP-42, RTP, NC, May 1983, Section 11.2.4.

As required by Massachusetts Air Pollution Control Regulation 7.09, measures will be taken to prevent excessive emissions of particulate matter during construction. Watering down of exposed soil on a daily basis is the most effective control method during construction, and this will be followed by seeding, covering, or paving of exposed areas as soon as possible in the construction process. Daily watering of exposed soil surface provides 50 percent control for the fugitive dust emissions. Fugitive dust will also be reduced by the placement of temporary retaining walls. Notification will be given 20 days prior to the start of construction as required by Massachusetts Air Pollution Regulation 7.09.

The short-term air quality impacts of the controlled fugitive dust emissions were estimated using the area source model in the EPA Volume 9 Guideline[1] and the 24-hour time scaling factor in the EPA Volume 10 Guideline.[2] Maximum 24-hour Total Suspended Particulate (TSP) concentrations were predicted for the nearest residential area on Sleeper Street, Pier 4 Restaurant, Commonwealth Pier 5, and the Boston Fish Pier.

The results in Table IV.2-10 show that maximum 24-hour TSP concentrations from construction activities will be greatest at the Pier 4 Restaurant, which is actually on the development site, and significantly less at nearby residential and commercial areas. The maximum impact at Pier 4 Restaurant of 55 ug/m^3 is 37 percent of the Massachusetts and National Ambient Air Quality Standard of 150 ug/m^3. The maximum impact at the Boston Fish Pier of 3 ug/m^3 is only 2 percent of the Standard. These impacts will only be temporary. On any day when there is significant precipitation or snow cover, fugitive dust emissions from the construction site will be essentially zero.

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[1] EPA Guidelines for Air Quality Maintenance Planning and Analysis Volume 9, (Revised): Evaluating Indirect Sources, Second Printing, EPA-450/4-78-001, Research Triangle Park, NC, 1978.

[2] EPA, Guidelines for Air Quality Maintenance Planning and Analysis Volume 10 (Revised): Evaluating Stationary Sources, EPA-450/4-77-001, Research Triangle Park, NC, 1977.

TABLE IV.2-10
Maximum Predicted 24-Hour TSP Concentrations from Construction Fugitive Dust Emissions at 4 Receptors

Receptor Location	TSP Concentration (ug/m^3) 24-Hour
Residential Area on Sleeper Street	14
Pier 4 Restaurant	55
Commonwealth Pier 5	4
Boston Fish Pier	3

Additional temporary air quality impacts will occur from the emissions of construction vehicles on the sites and from trucks traveling to and from the sites. Carbon monoxide emissions from diesel-powered vehicles are typically only half the rate of CO emissions from an automobile traveling at a similar speed. Thus, total CO emissions from 10 to 20 construction vehicles on site will not be significant compared to the emissions from automobiles on nearby streets.

Prior to construction, some demolition work will need to be done on-site. Currently, it is not known if asbestos is present in any of the structures slated for demolition. These structures include a wood-frame structure for the Pier 1 parking attendant, a brick warehouse building, and a wood-frame building used by Santoro Submarine Sandwich Shop. Prior to demolition, a site inspection will determine if asbestos is present. If found, DEQE will be notified and a removal plan will be formulated that complies with Massachusetts Air Pollution Control Regulation 7.15. DEQE will also be notified of the demolition plans in writing 20 days prior to any action.

- **Stationary Sources**

Stationary sources utilizing fossil fuel are likely for the sites. Natural gas would most likely be the fuel selected for space heating and hot water requirements. Based on a design day heat loss of 15 Btu/ hour-square foot and a heat delivery efficiency of 75%, the Fan Pier development of 3,386,000 gross square feet will require fossil fuel combustion equipment with a total heat input rating of 68.4 million Btu/hr. The Pier 4 development of 1,737,000 gross square feet will need equipment with a heat input rating of 34.7 million Btu/hr.

For both the Fan Pier and Pier 4, the proposed developments will be fossil fuel burning facilities with capacities greater than 3 million Btu per hour. Therefore, a permit from DEQE to satisfy DEQE Air Pollution Control Regulation 7.02 will be obtained prior to the installation and operation of fuel burning equipment at the site.

- **Intersection Analysis**

The Fan Pier and Pier 4 developments will cause relatively small increases in maximum 1-hour and 8-hour CO concentrations in 1990 and 1995 at roadway intersections. Total CO concentrations under the project Build scenarios, however, will still be in compliance with the NAAQS.

Project impacts on air quality are greatest in 1995, when the projects are scheduled for completion, and when the full impact from additional traffic will occur. The Third Harbor Crossing is a significant mitigating measure for these impacts. At the four intersections in Case 5 (1995 Build without Third Harbor Crossing) where air quality impacts are the greatest, the Third Harbor Crossing will mitigate all or most of the increase in CO concentrations. An additional set of mitigation measures--directed to these four intersections--should also be considered. These are discussed separately below.

Summer Street and Viaduct Street

The projects add up to 0.9 ppm to the maximum 8-hour CO concentrations at this intersection, primarily through an increase in the Viaduct Street southbound queue length. To improve air quality, it is recommended that the traffic signal be retimed to better match volume demand in 1995. Modeling results for this mitigation strategy (Table IV.2-11) indicate that the increase at the Araban Coffee Company receptor is reduced from 0.9 ppm down to 0.1 ppm. Decreases in 8-hour CO concentrations also occur at the other two receptors, such that post-mitigation concentrations are equal to or better than No-Build concentrations.

TABLE IV.2-11
Predicted Maximum 8-Hour CO Concentrations at the Intersection of Summer Street and Viaduct Street in 1995 without Third Harbor Crossing

Receptor Location	No-Build	Build	Build With Mitigation
Noymer Company	3.4	3.8	3.2
Wardrobe Maker, Inc.	2.1	2.2	2.1
Araban Coffee Company	3.2	4.1	3.3

Summer Street and Atlantic Avenue

The projects add up to 1.2 ppm to the maximum 8-hour CO concentrations at this intersection, primarily through an increase in the Atlantic Avenue northbound queue length.

To improve air quality, it is recommended that Atlantic Avenue south of Summer Street be converted to one-way operation northbound and that the traffic signal be retimed to better match volume demand in 1995. This will add a fourth through lane on the approach to Summer Street. Modeling results for this mitigation strategy (Table IV.2-12) indicate that the increase at the Dewey Square Park receptor is reduced from 1.2 ppm down to 0.2 ppm. Air quality is also improved at the MBTA Entrance receptor, although some small increases in CO concentrations simultaneously occur at the other two receptors. Overall, the proposed mitigation strategy will improve air quality in this area.

TABLE IV.2-12 Predicted Maximum 8-Hour CO Concentrations at the Intersection of Summer Street and Atlantic Avenue in 1995 without Third Harbor Crossing

Receptor Location	No-Build	Build	Build With Mitigation
Dewey Square Park	3.3	4.5	3.5
MBTA Entrance	4.2	5.3	4.4
South Station	3.1	3.1	3.3
One Financial Center	2.8	2.9	3.1

New Northern Avenue and Sleeper Street

The projects add up to 1.0 ppm to the maximum 8-hour CO concentrations at this intersection, primarily through an increase in the Sleeper Street southbound queue length. In order to improve air quality, a potential mitigation strategy involving a third westbound lane for New Northern Avenue was tested. This would allow the westbound traffic to be serviced in less time by the actuated traffic signal, shifting more time to Sleeper Street southbound and reducing its queue length.

Modeling results for this strategy (Table IV.2-13) indicate that the increase at the S.W. Corner receptor is reduced from 1.0 down to 0.7 ppm. The effect at the other receptors, however, is to increase project impacts. The strategy, in fact, appears to increase the overall air quality impacts. This is due to the fact that if New Northern Avenue is widened to three lanes westbound, the free right from Sleeper Street southbound onto New Northern Avenue must be eliminated. (The New Northern Avenue bridge west of this intersection will be able to accommodate three travel lanes in each direction.) Right turns will then be subject to queuing at the traffic signal and increased emissions on Sleeper Street result. Further analysis shows that retiming the signal and/or adding a second right-turn lane on Sleeper Street to give this approach more capacity reduces the air quality impacts for the Sleeper Street queue, but increases the air quality impacts for the Northern Avenue queues. The net effect is always about the same. In conclusion, overall air quality impacts at this intersection will be minimized if a third westbound lane is not added for New Northern Avenue.

TABLE IV.2-13
Predicted Maximum 8-Hour CO Concentrations at the Intersection of New Northern Avenue and Sleeper Street in 1995 without Third Harbor Crossing

Receptor Location	No-Build	Build	Build With Mitigation
N.W. Corner	3.0	3.5	4.3
N.E. Corner	3.4	3.9	4.6
S.W. Corner	2.7	3.7	3.4

New Northern Avenue and Seaport Access Road Entrance

The projects add up to 1.6 ppm to the maximum 8-hour CO concentrations at this intersection, primarily through an increase in queue length on the approach to the Seaport Access Road Entrance. To improve air quality, it is recommended that a third westbound through lane be added for New Northern Avenue and that a fourth southbound lane be added for Seaport Access Road (two lanes will turn right and two will turn left in the case where there is no Third Harbor Crossing). This will increase capacity and decrease queue lengths at the intersection. Modeling results for this mitigation strategy (Table IV.2-14) indicate that the increase at the S.W. Corner receptor is reduced from 1.6 ppm, down to 1.1 ppm. Impacts decrease at the N.E. Corner receptor, but increase slightly at the N.W. Corner receptor. Overall, the mitigation strategy will improve air quality at this intersection.

TABLE IV.2-14
Predicted Maximum 8-Hour CO Concentrations at the Intersection of New Northern Avenue and Seaport Access Road Entrance in 1995 without Third Harbor Crossing

Receptor Location	No-Build	Build	Build With Mitigation
N.W. Corner	4.4	5.0	5.2
N.E. Corner	4.7	5.8	5.4
S.W. Corner	2.8	4.4	3.9

Parking Garage Analysis

The impact of parking garage ventilation air on maximum CO concentrations at nearby pedestrian areas and building fresh air intakes has been shown to be minimal. All worst case concentrations will be in compliance with the NAAQS, and, thus, no mitigation measures are proposed.

Construction Impacts

Measures will be taken to prevent excessive emissions of particulate matter during construction. Exposed soil will be watered on a daily basis when there is no precipitation or snow cover. Exposed areas will be seeded, covered, or paved as soon as possible in the construction process. Temporary retaining walls will also aid in preventing the release off-site of particulate matter.

Prior to demolition of the few structures on-site, inspections will be made to determine if asbestos is present in any of the buildings. If found, DEQE will be notified and an asbestos removal plan will be formulated that complies with Massachusetts Air Pollution Control Regulation 7.15.

IV.3

Traffic-Related Issues
Noise

INTRODUCTION

This section describes the existing and future noise environment of the Fan Pier and Pier 4 sites and selected noise-sensitive areas in South Boston. Three categories of noise impacts are examined: (1) off-site vehicular noise related to project-generated trips; (2) on-site noise from vehicles and aircraft overflights, as it might affect the project's residential and open space areas; and (3) construction-related noise. Noise mitigation measures, including noise attenuation goals for new structures, are also discussed.

The vehicular noise analysis is based primarily upon the results of the traffic analysis presented in Chapter IV.1. Analysis years for the noise impact assessment are the same as those used for the traffic assessment: 1985 (existing conditions), 1990 (mid-point of the developments), and 1995 (completion of both developments). For the purposes of this noise analysis, there are no significant differences between the Initial Proposal Master Plans and the Lesser-Scale Alternative Master Plans.

DESCRIPTION OF THE ENVIRONMENT

■ Existing Conditions

In typical urban, commercial areas, the major contributors to the ambient noise environment are vehicular movements, aircraft overflights, industrial operations, and construction. The Fan Pier and Pier 4 sites and South Boston are subject to all of these sources. However, vehicular and aircraft noise sources predominate in the development area.

Aircraft noise is a special issue for these sites. The proposed marina is located approximately 6,500 feet from the end of Runway 9/27 at Logan Airport, and the sites are nearly on axis with the runway. The aircraft operations that most severely impact the Fan Pier and Pier 4 sites are turbojet departures on Runway 9/27. According to Massport data, the heaviest use of this departure pattern occurs during the four-month period between November and February, when the dominant winds originate from the northwest and west.

Vehicular noise at the development sites is particularly high due to the high level of traffic on Northern Avenue and the nearby Central Artery, the preponderance of fully loaded trucks and buses, and the uneven, cobblestone street surface along portions of Northern Avenue.

- **Noise Monitoring**

To assess current ambient noise levels and assign relative contributions by source, the present noise levels, both on and off-site, were measured and modelled. Monitoring was performed on August 23, 1985, and again on September 30, 1985. Measurements were made with a GenRad Model 1945 Community Noise Analyzer, and are given as exceedence or equivalence bands, expressed as L_x in dBA. A-weighted decibels (dBA) are the accepted units for measuring noise levels as they affect the population. The dBA scale is logarithmic, and weighted so as to approximate the frequency response of human hearing. The scale correlates well with the average perception of both absolute and relative loudness. L_x is the ambient noise level, in dBA, which is exceeded "x" percent of the time during the monitoring period. L_{eq} is the constant decibel level which provides the same total acoustical energy at the receptor as the time-varying ambient sound. L_{eq}, called the equivalent decibel level, is a measure of the dose of sound received over time. Typically encountered noise levels are included for comparison in Table IV.3-1.

At sites where traffic noise is the primary contributor to ambient noise levels, L_{10}, the decibel level exceeded ten percent of the time, is the relevant measurement. This measurement is recognized by both the U.S. Environmental Protection Agency (EPA) and the Federal Highway Administration (FHWA). In addition, the FHWA has published Design Noise Levels (DNL) for guidance in determining traffic noise impacts and possible levels of mitigation. The DNL are given as peak hour L_{10} in dBA, where the level is measured or modeled during peak hour traffic flow. The DNL is 70 dBA for residential areas, and 75 dBA for commercial areas.

At locations near airports, where aircraft noise levels dominate the environment, L_{dn} is the decibel measure-

TABLE IV.3-1
Comparative
Noise Levels

Typical Decibel Values Encountered in Daily Life and Industry*

	dBA
Rustling leaves	20
Room in a quiet dwelling at midnight	32
Soft whisper at 5 feet	34
Men's clothing department of large store	53
Window air conditioner	55
Conversational speech	60
Household department of large store	62
Busy restaurant	65
Typing pool (9 typewriters in use)	65
Vacuum cleaner in private residence (at 10 feet)	69
Ringing alarm clock (at 2 feet)	80
Loudly reproduced orchestral music in large room	82
Beginning of hearing damage with prolonged exposure	85
Printing press plant	86
Heavy city traffic	92
Heavy diesel-propelled vehicle (about 25 feet away)	92
Air grinder	95
Cut-off saw	97
Home lawn mower	98
Turbine condenser	98
150 cubic foot air compressor	100
Banging of steel plate	104
Air hammer	107
Jet airliner (500 feet overhead)	115

*When distances are not specified, sound levels are the value at the typical location of the machine operator.

Source: Federal Aviation Administration, Aviation Noise Effects, Report No. FAA-EE-85-2, March, 1985.

ment accepted by the EPA and the Federal Aviation Administration (FAA). L_{max} is used occasionally as an impact guideline to determine the potential for speech or sleep interference. Where local agencies consider aircraft noise as the major environmental noise source, L_{max} can be used to help determine the total decibel reduction necessary to eliminate it as an interference. L_{dn} is the equivalent day-night sound level in dBA, with an extra weighting of 10 dBA given to the readings taken between the hours of 10:00 p.m. and 6:00 a.m. L_{max} is the maximum decibel level in dBA measured during any sampling period. An annual average L_{dn} of 65 dBA or greater is defined as a serious noise impact by the FAA. In addition, to assist local authorities, the FAA has promulgated a noise/land use compatibility table using L_{dn} as the noise measurement. That part of the table relevant to the project area is reproduced as Table IV.3-2.

The FAA Integrated Noise Model, Version 3.8, used by the Massachusetts Port Authority (Massport) to forecast the noise levels associated with the operation of Logan Airport, predicts an onsite noise level of 65 dBA +/- 5 dBA. The contour map derived from the Massport modeling results is presented as Figure IV.3-1. From the map it can be seen that the Fan Pier and Pier 4 sites are proximate to the L_{dn} 65 and L_{dn} 70 contour lines generated by flights using Runway 9/27. According to the FAA guideline, the area between the 65-70 contour lines is compatible with residential uses other than mobile homes or transient lodgings if an exterior to interior sound level reduction of 25-30 dBA is achieved. Normal construction provides 20 dBA of decibel reduction. This area is also compatible with all forms of outdoor and water recreation except outdoor music shells. Moreover, as an increasing proportion of commercial aircraft conform to the federal noise emission standards (14 CFR 36), with full compliance scheduled for 1988, the impact of aircraft generated noise will decrease.

The results of the noise monitoring are presented in Table IV.3-3. The monitoring station locations, chosen to satisfy agency requirements, are shown on Figure IV.3-2. The L_{10} levels at all stations are at or above the FHWA Design Noise Levels for residential use, as may be expected in a high density urban area. The L_{eq} levels, which combine the noise from traffic and aircraft, are also at or above the level which the FAA suggests is compatible with that land use. It should be noted that the FAA considers only the noise generated from aircraft when making their predictions or compatibility assessments, not the total ambient noise environment.

TABLE IV.3-2
Land Use
Compatibility
With Yearly
Day-Night
Average
Sound Levels

Land Use	Yearly day-night average sound level (L_{dn}) in decibels Below 65	65-70	70-75
Residential			
Residential, other than mobile homes and transient lodgings	Y	N(2)	N(2)
Mobile home parks	Y	N	N
Transient lodgings	Y	N(2)	N(2)
Commercial Use			
Offices, businesses and professional	Y	Y	25(4)
Recreational			
Outdoor sports arenas and spectator sports	Y	Y(3)	Y(3)
Outdoor music shells, amphitheaters	Y	N	N
Nature exhibits and zoos	Y	Y	N
Amusements, parks, resorts and camps	Y	Y	Y
Golf courses, riding stables and water recreation	Y	Y	25(4)

Notes:

(1) Y = Acceptable
N = Not Acceptable

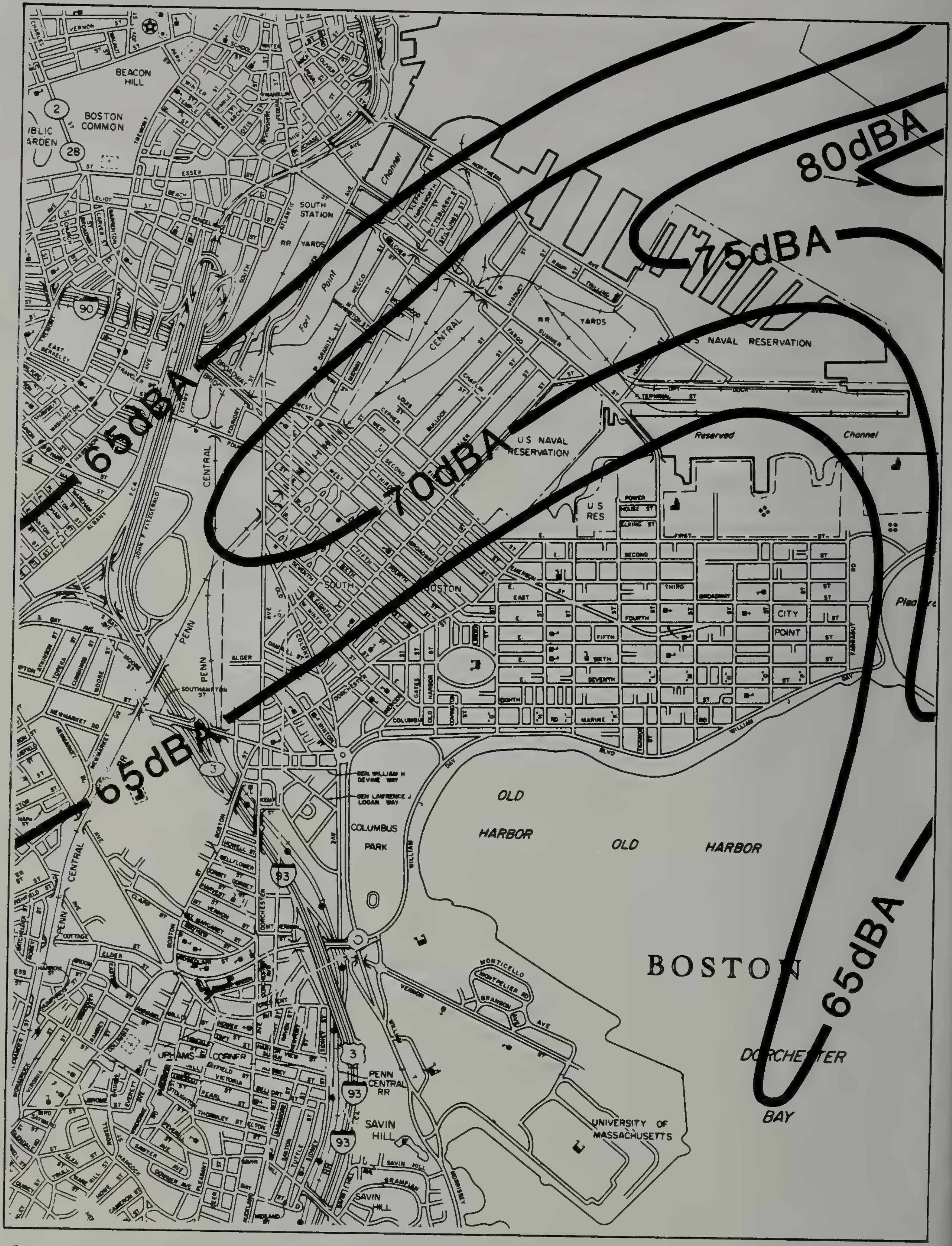
(2) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assumes mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(3) Land use compatible provided special sound reinforcement systems are installed.

(4) Numbers represent the NLR necessary for compatibility.

Source: FAA, Aviation Noise Effects, Report No. FAA-EE-85-2, March, 1985.

FIGURE IV.3-1
Logan Airport
1984 Noise
Contours



Source: Massport

TABLE IV.3-3
Noise Monitoring Results

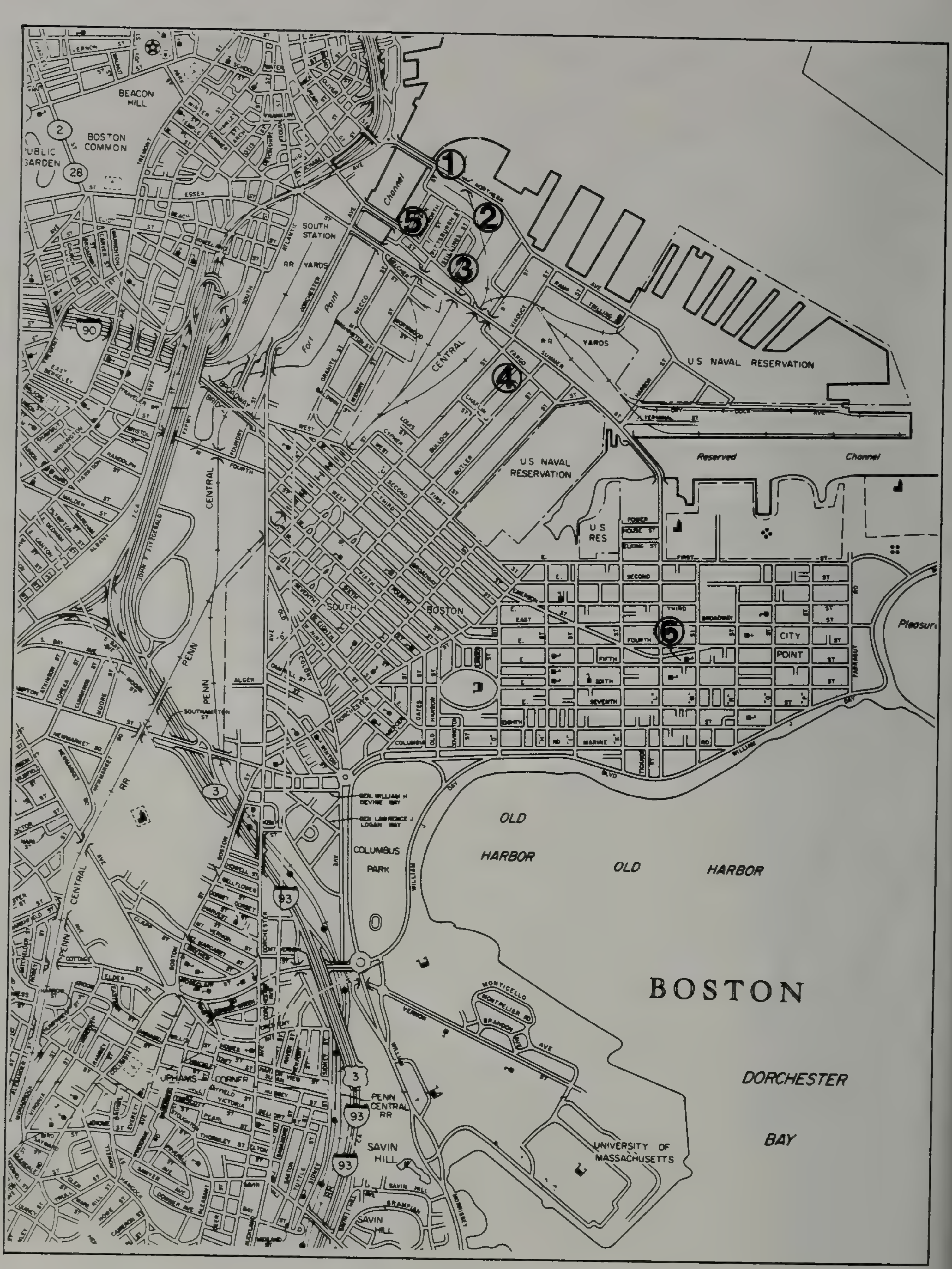
Time	Station*	L_{10}	L_{EQ}	L_{MAX}
8/23/85 0940-1110	1	74.6	72.2	93
8/23/85 1120-1250	2	75.1	73.5	95.4
8/23/85 1305-1335	3	79	76	86
8/23/85 1345-1515	4	75.2	73.6	98.7
9/30/85 1430-1600	5	76	77	105
9/30/85 1620-1750	6	70	68.5	97.4

* See Figure IV.3-2 for location of noise monitoring stations.

Notes on Readings

Station Number	Notes
1	Aircraft were taking off over East Boston and South Boston.
3	Backhoe and jack-hammer were operating nearby.
4	Roads in this area are very uneven and pot-holed; heavy truck traffic.
5	Clear, sunny, 80°F, 5-10 mph southwest winds. 1440 fire engine with siren passes, probably accounts for high LMX. 1530-1600 heavy commuter traffic from Sleeper Street. Heavy pedestrian traffic at all times.
6	Clear, sunny, 77°F, 5-10 mph southwest winds, heavy rush hour bus traffic. 1700-1730 very high commuter traffic in all directions.
All	L_{10} levels are the average of three 1/2 hour periods.

FIGURE IV.3-2
Noise
Monitoring
Locations



One reason for the high decibel levels at the project sites, (Station 1) may be the heavy commercial traffic on Northern Avenue. Fully loaded trucks and buses running on an uneven, cobblestone street appear to contribute more to the local ambient noise level than overhead aircraft. With the relocation and improvement of Northern Avenue, the project area baseline noise levels could actually be reduced. Area construction projects (roads and buildings) underway at the time of the noise monitoring could also have contributed to the higher than expected noise levels. Although any specific construction projects are only a temporary source of noise, they are considered part of the urban noise background. Completion of such projects can also reduce background noise levels.

PROBABLE PROJECT IMPACTS

Of main concern in the future is the level of noise caused by traffic on the residential streets of South Boston. This future traffic noise was modelled at certain South Boston intersections using the FHWA Highway Traffic Noise Prediction Model 77-108 and the modifications in Appendix I. The traffic data for the peak p.m. hour, presented in Chapter IV.1 of this Draft EIR, was used to determine the worst-case future noise levels. As in the traffic analysis, future traffic levels include trips related to the Fan Pier and Pier 4 Developments and to other developments in South Boston and downtown.

Traffic noise also was analyzed for its impact on the project sites. The noise levels generated by the complex of streets surrounding the site was modeled using the STAMINA 2.0 computer model, an automated version of the above-mentioned FHWA model. Again, traffic data for the peak p.m. hour was used to predict the worst case noise levels.

■ Off-Site Noise Conditions

The primary concern of the noise analysis was to assess the impact of traffic on the streets of South Boston. To define the impact, the difference between the current level of noise and future levels must be examined. Because the human ear is only sensitive to changes in decibel level of 3dBA or greater, an increase of 0-5 dBA in the overall noise levels has been defined as an insignificant impact, 5-10 dBA as a moderate impact, and 10dBA or more as a severe impact. The results of the modeling are presented in Table IV.3-4. The locations of the modeling receptors are shown on Figure IV.3-3.

TABLE IV.3-4 Noise Modeling Results (dBA) (1)

Year/Alternative	No-Build	Build
	Station A (2)	
1990	66	69
1995 with THC	65	70
1995 without THC	67	71
	Station B (2)	
1990	0.5	0.9
1995 with THC	0.4	0.6
1995 without THC	1.1	1.6
	Station C (2)	
1990	0.6	0.4
1995 with THC	0.5	0.7
1995 without THC	1.2	1.9
	Station D (2)	
1990	0.8	1.1
1995 with THC	0.0	0.2
1995 without THC	1.4	1.8
	Station E (2)	
1990	0.8	1.2
1995 with THC	0.2	0.5
1995 without THC	1.6	2.2
	Station F (2)	
1990	0.4	0.7
1995 with THC	0.1	0.1
1995 without THC	0.8	1.4

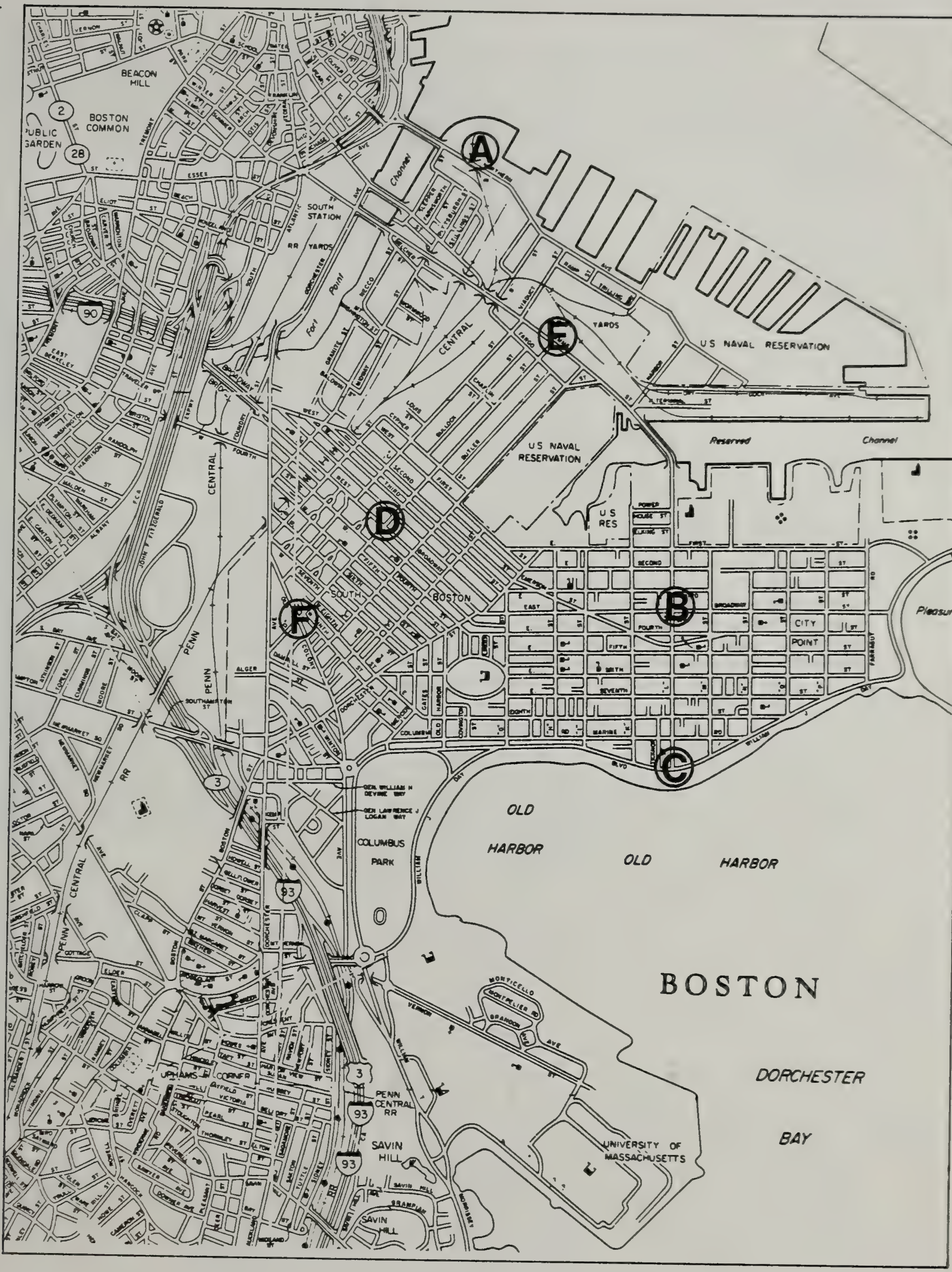
Notes:

(1) FHWA Traffic Noise Prediction Model 77-108 (with Appendix I modifications) used for Stations B-F. FHWA STAMINA 2.0 used to model noise at Station A.

(2) Numbers for Station A are actual predicted decibel levels; numbers for Stations B-F are the decibel increase resulting from the chosen alternative.

(3) THC = Seaport Access Road/Third Harbor Crossing. See Chapter IV.1-1.

FIGURE IV.3-3
Noise
Modeling
Locations



The values for Stations B-F represent the difference between 1985 noise levels and those predicted for 1990 and 1995 both with and without the Third Harbor Crossing. As can be seen in Table IV.3-4, there are only noise impacts of one to two decibels in the streets of South Boston. Changes in the ambient sound levels as low as these are considered insignificant, and undetectable by most people. The low level of change is likely caused by the relatively high traffic volumes already existing on the through streets, and by the low percentage increase in traffic volumes caused by the project. In addition, the traffic generated by the site quickly disperses through a wide array of streets and intersections, thus diluting its effects and causing an insignificant noise impact at any one location.

■ On-Site Noise Conditions

The second purpose of the modeling is to determine the compatibility of the proposed site activities with predicted ambient noise levels. The modeling conducted for the sites used the traffic data and road network for the peak p.m. hour, presented in Chapter IV.1, to predict the actual future noise levels. The results for the project area are presented as Station A in Table IV.3.4. The numbers are the average L_{10} given in dBA for the project areas closest to the roads. The modeling did assume a smoother paved surface would be included as part of the Northern Avenue reconstruction. If the present cobblestone pavement is retained, decibel levels would likely be higher, approaching those currently monitored.

An examination of the data indicates that areas of the proposed sites will be at the recommended DNL for residential uses in 1995, and will be slightly above that level if the Third Harbor Crossing is not constructed. However, the reduction measures used on-site to lower aircraft noise impacts will also decrease, if not eliminate, any impacts associated with traffic noise. In addition, since significant portions of the projects will be located farther away from Northern Avenue than the test station and will be shielded by intervening buildings, activities at those locations will be less affected by traffic noises. Thus, no conflict is predicted between the proposed uses for the sites and predicted future ambient noise levels.

■ Construction Noise

Construction noise impacts are, by nature, short-term events, affecting primarily the area directly adjacent to the construction site. Traffic generated by construction activities is not expected to be a significant percent of the daily car and truck traffic in the area, and no construction trucks will be routed through residential areas. The short-term noise impacts associated with the construction of these projects will be quite variable, and depend on such factors as what phase of construction is taking place, and the type, quantity, and location of the equipment employed during that phase. Figure IV.3-4 presents the range of A-weighted noise levels associated with various types of construction equipment. These values represent worst case conditions for the particular piece of equipment, and actual levels may be lower. Decibel levels from two or more pieces of equipment are not combined by simple addition as explained by Table IV.3-5.

One general mitigating feature would be the restriction of construction equipment operation, where possible, to daytime hours. Work on the projects would take place from Monday through Friday unless special or emergency conditions require otherwise. In addition, the project sites are well removed from sensitive residential areas; this distance will lessen any noise impacts from the construction process. The nearest sensitive receptor is the Chapel of Our Lady of Good Voyage, which will only be slightly impacted by the weekday construction activities.

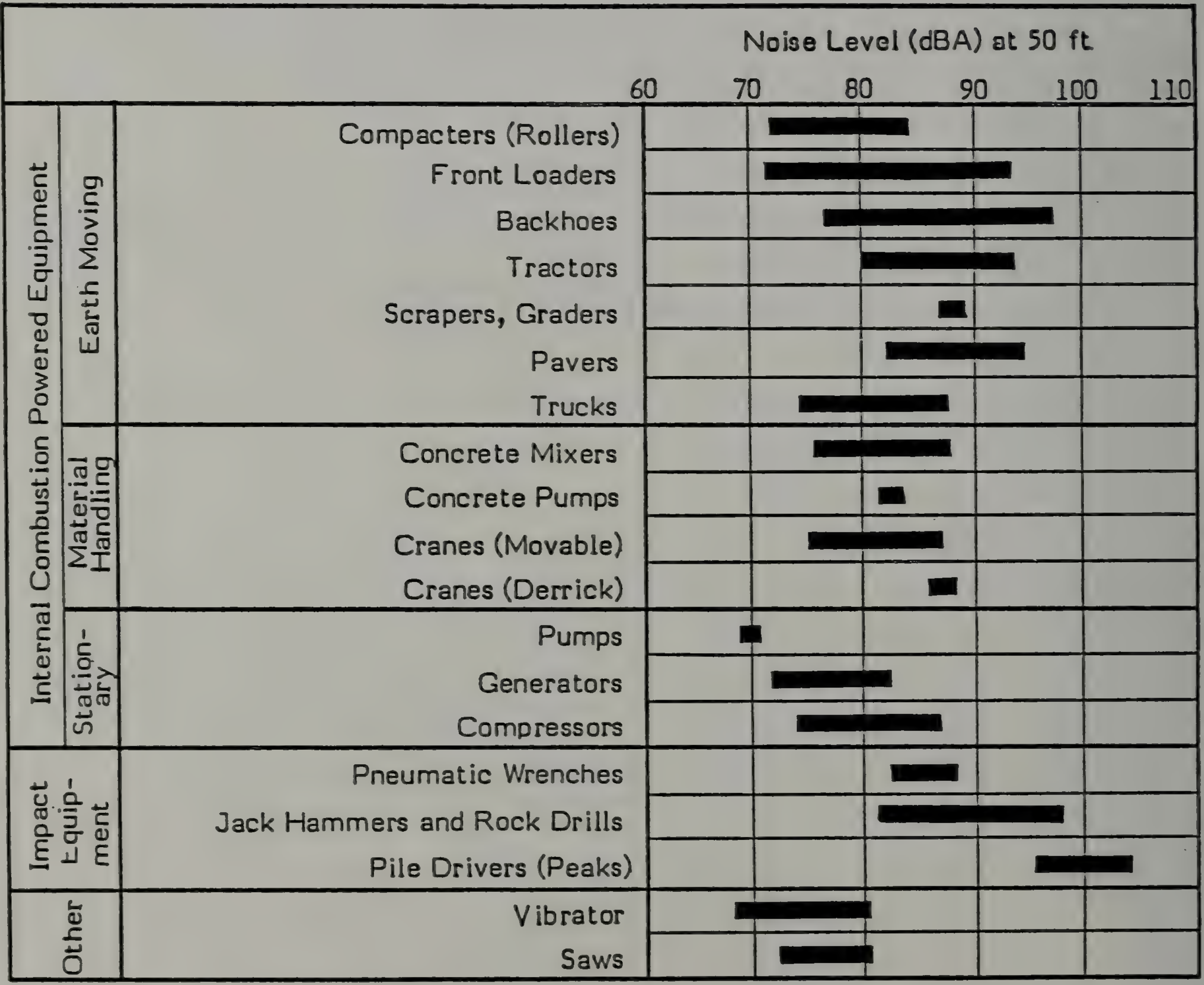
Other potential means of construction noise migitation could involve the selection of the quietest models of construction equipment and the use of related apparatus such as shields or other physical enclosures around the worst noise-producing machinery.

The construction activities will comply with 310 CMR 7.10 and will be coordinated with the appropriate agencies.

MITIGATION MEASURES

Steps to lower any adverse noise impacts in the community or on-site will be taken as needed and the projects will be coordinated with the appropriate state and local agencies during all phases. For traffic-related noise, the measures proposed to reduce and manage traffic in Chapter IV.1, will also serve to mitigate traffic noise, both on-site and in the surrounding community. Aircraft noise will decrease as more and more commercial aircraft are brought into compliance with 14 CFR 36. Full compliance is scheduled for 1988 and will be felt in the entire local area. On the sites, noise levels within the proposed buildings will be kept at appropriate levels through design and constructon techniques. Potential noise from the HVAC system will be controlled by proper design and placement of the units.

FIGURE IV.3-4
Construction
Equipment
Noise
Range



Construction Equipment Noise Range
source: EPA

TABLE IV.3-5
Addition of
Decibels (1)

Difference in Sound Level	Add to Larger Level
0	3.0
1	2.5
2	2.1
3	1.8
4	1.5
5	1.2
6	1.0
7	0.8
8	0.6
9	0.5
10	0.4
12	0.3
14	0.2
16	0.1
Greater then 16	0.0

Notes: (1) use the table by first finding the difference between the two decibel levels to be combined. Find that value in the difference column and add the corresponding value in the add column to the larger decibel value. More than two values can be added by taking them in pairs and using the subtotal.

Noise related to construction traffic will be lowered by the measures proposed to manage that traffic also discussed in Chapter IV.1. Measures to comply with 310 CMR 7.10 will include proper construction scheduling, the use of mufflers on appropriate equipment, and the placement of temporary barriers to shield any receptors.

V.1

Urban Design Issues
Visual Quality

INTRODUCTION

Through the development of the master plan designs, the proponents of the Fan Pier and Pier 4 Developments have sought to:

- Create a new district of Boston's Inner Harbor waterfront that respects the historic and spatial character of the city, while encouraging public access by providing a variety of new land and water-based activities and facilities for public use on the sites.

- Contribute to the definition of emerging development in the Fort Point Channel/South Boston waterfront area so that the Fan Pier and Pier 4 Developments complement and enhance the city's special urban character.

- Actively participate in an open, thoughtful public process that results in master plan designs incorporating the goals and objectives of the public within the framework created by the designers, and respecting the urban and waterfront contexts of the project sites.

In this section, the Fan Pier Development and Pier 4 Development Master Plans will be analyzed in terms of urban design issues--i.e., their relationship to the surrounding urban design context, their relationship to design plans and policies for the area, and the character of the visual experience created.

The discussion begins with a description of the urban and waterfront contexts of the project sites. Second, the public plans, guidelines, and regulations that influenced the master planning process are referenced. Finally, the Initial Proposals and Lesser-Scale

Alternatives for the Fan Pier and Pier 4 Developments are described and analyzed through a series of before and after views taken from important vantage points for each of the projects and the surrounding area.

PLANNING AND URBAN DESIGN CONTEXT

■ Development Sites

Located at the mouth of Fort Point Channel on Boston's Inner Harbor, the Fan Pier and Pier 4 sites occupy approximately 25 acres of waterfront land in South Boston. The special characteristics of the South Boston waterfront, Commonwealth Pier 5, the Boston Wharf Company buildings, Fort Point Channel, Inner Harbor waterfront, and downtown Boston provide the urban design context for the two developments (see Figure V.1-1).

Historically, Fan Pier and Pier 4 were areas of active maritime use in Boston Harbor. The Commonwealth of Massachusetts began filling the land at the site of Fan Pier in 1869. The Commonwealth completed the construction of the Fan Piers 1 and 2--the first piers along South Boston's waterfront--in 1882. The filling and construction of Pier 4 was completed by the Commonwealth in 1889. Pier 3, once part of the Fan Pier, was constructed and subsequently demolished in the period between 1900 and 1910. By the early 1900's, railroad and shipping interests had developed these piers as an important cargo terminal in South Boston. Although railroad and shipping companies continued to occupy Fan Pier and Pier 4 until 1960, active maritime use of the piers had been declining since the end of World War II.

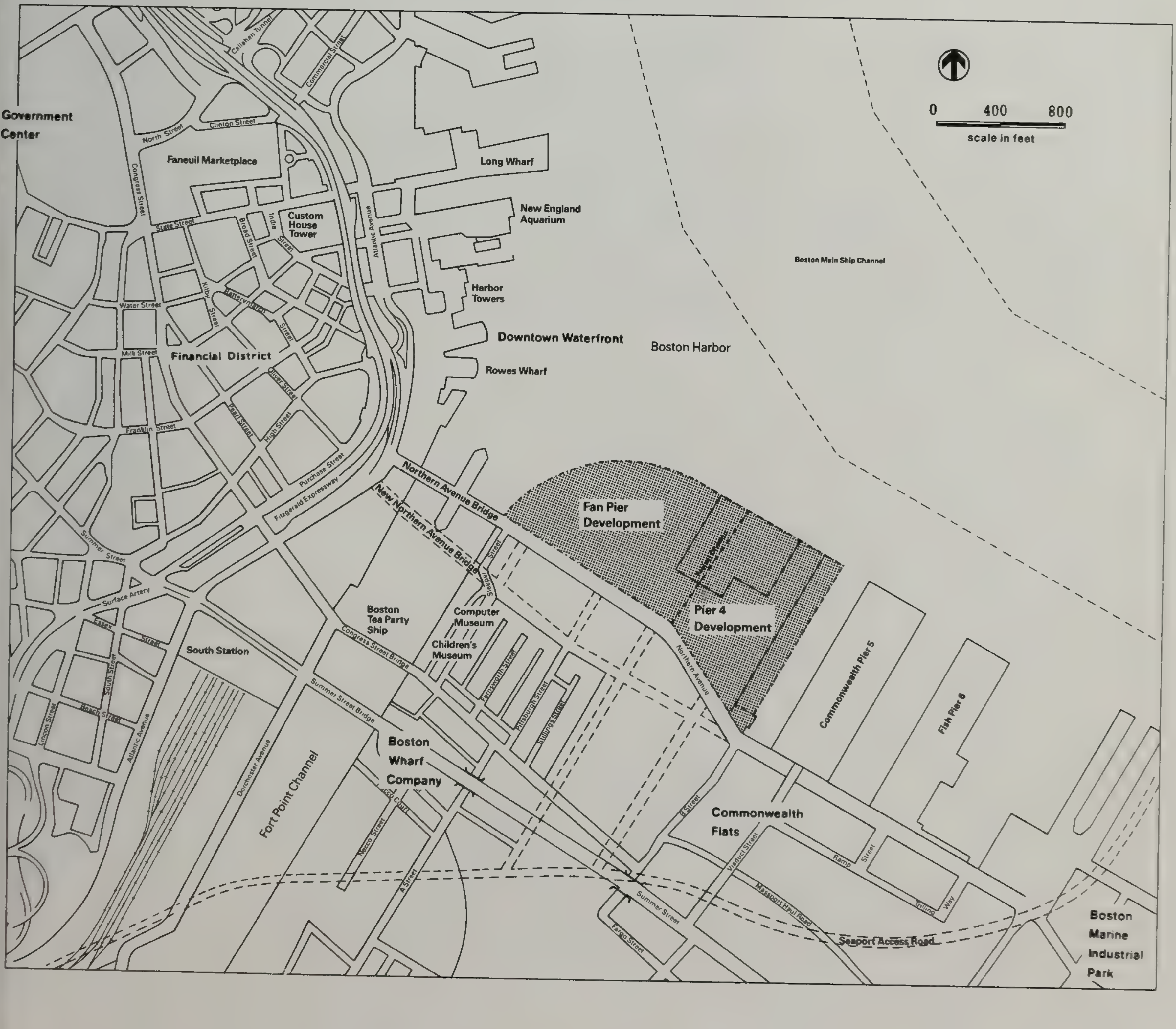
Since 1960 the Fan Pier has been used primarily as a surface parking lot. Anthony's Pier 4 Restaurant and associated surface parking area have been operating at Pier 4 since 1963. At present the only maritime activity on either project site is the excursion boat operation at the western edge of the Fan Pier, adjacent to the Northern Avenue Bridge.

■ Surrounding Context

South Boston Waterfront

The area of South Boston neighboring Fan Pier and Pier 4 supports industrial, warehouse, truck and rail distribution, institutional, and commercial land uses. Immediately across Northern Avenue to the south of Fan Pier and Pier 4 are several large, mostly vacant parcels used primarily for at-grade parking. The Chapel of Our Lady of Good Voyage is located on the south side of Northern Avenue across from the Fan Pier site. Some portions of the South Boston waterfront are still characterized by long piers extending perpendicularly over the water from Northern Avenue, while other portions have been filled for industrial/maritime uses.

FIGURE V.1-1
Surrounding
Urban Areas



Located within the South Boston waterfront area are large warehouse structures, the Fish Pier with related industries on Commonwealth Flats, a marine cargo terminal, restaurants, and large areas of vacant land.

Commonwealth Pier 5

An important component of the Fan Pier and Pier 4 site context is the historic Commonwealth Pier 5, which lies 300 feet east of Pier 4. Construction of Commonwealth Pier was started in 1912 and completed in 1914 under the sponsorship of the directors of the Port of Boston, a state agency. The structure, which originally consisted of a four-floor Headhouse and three two-level sheds, was accessible to both vehicular and rail traffic, allowing expeditious transfer of both passengers and cargo. The development of Commonwealth Pier signaled the re-emergence of Boston as an important East Coast port in the early twentieth century. The pier became the center of the American wool trade, as well as a port of entry for European immigrants. With the emergence of containerized cargo, Commonwealth Pier was no longer used for shipping purposes, and was eventually converted to exhibition space. Commonwealth Pier 5 is currently undergoing renovation and reconstruction, and is scheduled to reopen in January, 1986, as Boston's World Trade Center. Though the shape of the pier will remain intact, its function will change dramatically. The intensity of use as an exhibition hall, trade mart, conference center, and office development for the high technology industry will provide an active counterpoint to the Pier 4 Development.

In addition to its role in Boston's maritime history, Commonwealth Pier is architecturally significant. The Pier Headhouse is one of the two major examples of public Beaux Arts architecture in Boston, with a two-level series of arches, Tuscan columns, and a classical style second floor arcade. Commonwealth Pier is listed in the National Register of Historic Places.

Boston Wharf Company Buildings

The Boston Wharf Company buildings lie to the south of Summer Street, approximately two blocks from the project sites, and separated by a large, at-grade parking lot. These buildings were constructed in the late 1800's and early 1900's for warehouse and factory use, serviced directly by the ship and rail transportation facilities concentrated in this area of South Boston. The heights of the buildings generally range from 70 to 90 feet, with brick or stone and heavy timber construction. Many of the Boston Wharf Company buildings have been recently rehabilitated for residential and office uses while retaining the masonry facades of the original buildings.

Fort Point Channel

The portion of South Boston now commonly known as the Fort Point Channel area was originally marshland and tidal flats. Until the early nineteenth century, the majority of the land area north of what is now First Street was part of Boston Harbor. Between 1836 and 1890, extensive filling of this area was carried out by the Boston Wharf Company and other concerns, and docking facilities and warehouses were constructed. Office and commercial and industrial uses currently line the banks of the channel, including surface parking lots, warehouses and factories, a complex of museums, restaurants on the east bank, and on the west bank major public bus, transit, and train stations. Permanently docked boats moored in the Fort Point Channel provide some additional office, commercial, restaurant, and museum display space.

The series of bridges over the channel are of historical and engineering interest. The bridge at the mouth of the channel, adjacent to the Fan Pier site, is the Northern Avenue Bridge. This swing bridge, scheduled to be replaced by a new bridge a short distance to the south, has been determined by the U.S. Secretary of the Interior to be eligible for listing in the National Register of Historic Places. The Boston Redevelopment Authority (BRA) is studying possible future uses for the old bridge, including such facilities as a public marina at its base and a museum with displays depicting the history of the Fort Point Channel area and its bridges.

Inner Harbor Waterfront

Until the 1960's, Boston's downtown waterfront was a backdoor to the city, lined with industrial uses and warehouses that were inaccessible to the public. The rebirth of the waterfront began in the 1960's with the renovation of a few warehouse buildings as apartments. A major catalyst for reintroducing the waterfront into the city was the implementation of the Government Center and Faneuil Hall Marketplace projects, which together established a strong link to the Inner Harbor. Atlantic Avenue was rerouted to accommodate a waterfront park, and, subsequently, restaurants, museums, excursion and commuter boats, and offices began to locate along the piers. Today major portions of the harbor frontage is visually and physically accessible to the public. The Harborpark/Harborwalk concept instituted by the city over the last year is intended to create a continuous pedestrian way, with complementary open spaces, along the water's edge. The first phase being implemented under the guidance of the BRA and the Harborpark Advisory Committee is to extend 7 miles along the Inner Harbor from the Charlestown Shipyard to Pier 4.

Downtown Boston

Across the Northern Avenue Bridge, to the northwest of the Fort Point Channel area, is Boston's Financial District with the Custom House District and Government Center lying just beyond. Businesses are housed in a pastiche of older, nineteenth century structures and contemporary twentieth century high-rise office buildings. The buildings are located within a complex pattern of seventeenth and eighteenth century streets that focus on "squares."

The neighboring Custom House District, surrounding the historic Custom House Tower at the corner of State and India Streets, is designated as an historic district on the National Register. The Custom House District contains some of the best remaining examples of brick and granite early nineteenth century mercantile buildings in the United States. Today the buildings in the district house a variety of businesses.

Government Center, which lies to the north of the Custom House District, is composed of a mixture of old and new city, state, and federal governmental office buildings, as well as the historic Faneuil Hall and the Faneuil Hall Marketplace. The successful renovation of this area over the last two decades, and the revitalization of the downtown shopping area west of the Financial District at Washington and Summer Streets, have been major factors behind the growing demand for additional downtown office, hotel, retail, and residential space. However, most of the buildable land is now occupied and new development has been constrained by a growing awareness that one of downtown Boston's major attractions is its historic, pedestrian-scale character.

To continue to accomodate the burgeoning space requirements of new Boston development and preserve the special qualities of the downtown proper, the city is looking for new areas into which to expand urban businesses. The location of the relatively undeveloped area of South Boston across the Fort Point Channel from the Financial District makes it a logical area into which to extend Boston's downtown.

■ Conclusion

Immediately surrounded by expanses of water and vacant land, the Fan Pier and Pier 4 sites lack any strongly defined, formal, physical contextual urban fabric. The Fan Pier and Pier 4 Development Master Plans therefore draw their context from Boston's larger context of the physical arrangement of commercial structures, urban street patterns, and full block development, relieved by public squares, parks, and water vistas. The Inner Harbor waterfront, extending from Commonwealth Pier 5 in South Boston to the edge of the downtown waterfront near

Lewis Wharf, provides the immediate contextual references. The master plans seek to respond to this context by:

- Reflecting sufficient densities and heights to correspond to the density of development rising from the opposite shore of the Fort Point Channel into the Financial District. The channel will be transformed from a border edge to the downtown into an element of the harbor penetrating the city and embraced by an extended downtown.
- Drawing their basic organizational elements from the street and block organization provided by the Boston Wharf Company buildings to the south, thereby linking the waterfront back into the existing fabric of this historic context.
- Creating a carefully modulated transition from the structured fabric of the surrounding area, established by the South Boston street grid system and the downtown's larger-scale building elements, to less rigid, lower-scale forms and pathways along the water's edge.

DEVELOPMENT OF THE MASTER PLANS

Following review of the 1981 Master Plan for the Fan Pier and Pier 4 Developments, new master plans were developed for the Fan Pier and Pier 4 in 1984-1985, as discussed in detail in Chapters I-III. The Initial Proposals for the Fan Pier and Pier 4 Development Master Plans presented in the spring and summer of 1985 responded to guidelines for waterfront development adopted by the city. Review by various state and local groups and agencies resulted in the creation of Lesser-Scale Alternatives for the Fan Pier and Pier 4 Developments that more closely respond to the public goals and objectives for these sites. These goals and objectives have been defined through city guidelines for development; through zoning and other land use regulations; and through the extensive on-going public review process, described at the beginning of Chapter III.

■ Guidelines for Development

During the initial phases of the master planning for Fan Pier and Pier 4, the proponents and their architects researched documented city plans and design guidelines applicable to the Inner Harbor waterfront. Three city documents were studied:

- Boston Harbor Plan, Challenges & Opportunities for the 1980's, prepared for the Boston Redevelopment Authority, City of Boston, 1979;

- Harborpark, A Framework for Planning Discussion, prepared by the Boston Redevelopment Authority, City of Boston, October, 1984; and

- Harborpark, Interim Standards for the Inner Harbor, prepared by the Boston Redevelopment Authority, November, 1984.

These reports reflect the progression of city planning for the Inner Harbor waterfront from a conceptual framework to design standards.

The Boston Harbor Plan outlined goals and objectives to guide city policies affecting future development of Boston's waterfront. These goals sought to insure that development along the waterfront would respect special qualities of the waterfront and integrate public and private elements to keep the water's edge accessible and alive for public use. In addition, the plan included general recommendations for specific areas along the waterfront. For the Fort Point Channel area, seen as a site of future residential, office, and commercial development, the report emphasized the importance of public access, open space, and water-dependent uses.

In the mid-1980's, the types of recommendations included in the Boston Harbor Plan were reflected in a set of interim guidelines prepared by the BRA as part of the Harborpark planning program established by the city to promote "the balanced development and continued revitalization of Boston's waterfront." The Harborpark planning process began with a preliminary discussion report that established a 15-month participatory planning period. One of the first steps in this planning process was the development of interim design guidelines for the Inner Harbor waterfront. The guidelines, released on November 20, 1984, present four design goals followed by more than 100 specific design standards related to urban form, character, public domain, and transportation. These Harborpark design goals are:

- "To encourage appropriate and rational growth that includes major public amenities and reflects sensitivity to human scale and needs;

- To provide ample access including a continuous pedestrian promenade at the water's edge and waterside facilities for ferries, water-taxis, and pleasure boats;

- To provide spaces and facilities for recreational, cultural, and educational activities; and

- To ensure compatibility of new development with the historic traditional character of the Inner Harbor waterfront."

The proponents for the Fan Pier and Pier 4 projects and their architects have respected these goals and those standards/guidelines applicable to the master plan level of design for these sites. The standards related to architectural materials and landscaping will be used to guide the later phases of design for the two projects.

The Harborpark design standards apply to a wide range of issues that may be affected by how a project is designed. Many of the concerns--such as air quality, transportation, public access, and water-dependent uses--are consistent with the environmental categories covered in MEPA's scope for the Fan Pier and Pier 4 projects, and are addressed in other sections of this Draft EIR. The Harborpark standards most often referred to in the public review of the Initial Master Plan designs that has occurred to date were those that dealt with: (1) lower buildings along the water's edge, (2) the provision of extensive public open space, (3) the establishment of views to the harbor and downtown from both on and off site, (4) the integration of water-dependent uses, (5) the plans for pedestrian and vehicle circulation, and (6) the maintenance of the Harborwalk route directly along the harbor's edge.

Following extensive review by the BRA urban design staff, state agency reviewers, and representatives from the Fan Pier and Pier 4 Civic Advisory Committee, the Harborpark Advisory Committee, and other interested public interest groups, the proponents sought further resolution of the issues presented by Harborpark, and other guidelines for the project sites, through the design of the Lesser-Scale Alternatives. While retaining the framework and overall goals established by each of the Initial Master Plan Proposals, the Lesser-Scale Alternatives for the Fan Pier and Pier 4 Developments, as described in Chapter III, better respond to public needs as expressed through established guidelines and a comprehensive, on-going review process. Through this process of guidelines and public review, the Fan Pier and Pier 4 Master Plan Alternatives have been designed within the urban design context of the project sites while responding to governmental, agency, and community concerns. The Project Design and Visual Impact Analysis, which begins on the following page, document the results of the public, interactive process by which Harborpark goals and design guidelines were expressed in the master plans proposed for these sites.

Regulatory Consultations

In addition to the federal, state, and local review process for the Fan Pier and Pier 4 Developments (described in Chapters I and III), the following agency reviews and consultations with reference to overall design and planning concepts are occurring.

Zoning Regulations. The existing zoning for Fan Pier and Pier 4 is W-2, permitting waterfront/industrial uses. However, the proponents of the Fan Pier and Pier 4 Developments will seek Planned Development Area (PDA) approval from the city for both Master Plan and Site PDAs.

FAA Flight Path. In compliance with Federal Aviation Administration (FAA) Regulations, Part 77, the proponents of the Fan Pier and Pier 4 Developments have initiated FAA reviews of the projects. Both proponents have filed applications with the FAA to assure non-interference with the visual approach zone for Logan Airport's Runway 9/27, which encompasses portions of the sites. In addition, the proponents consulted Massport's Aviation Planning Department during the master planning of the sites for guidance on permissible building heights.

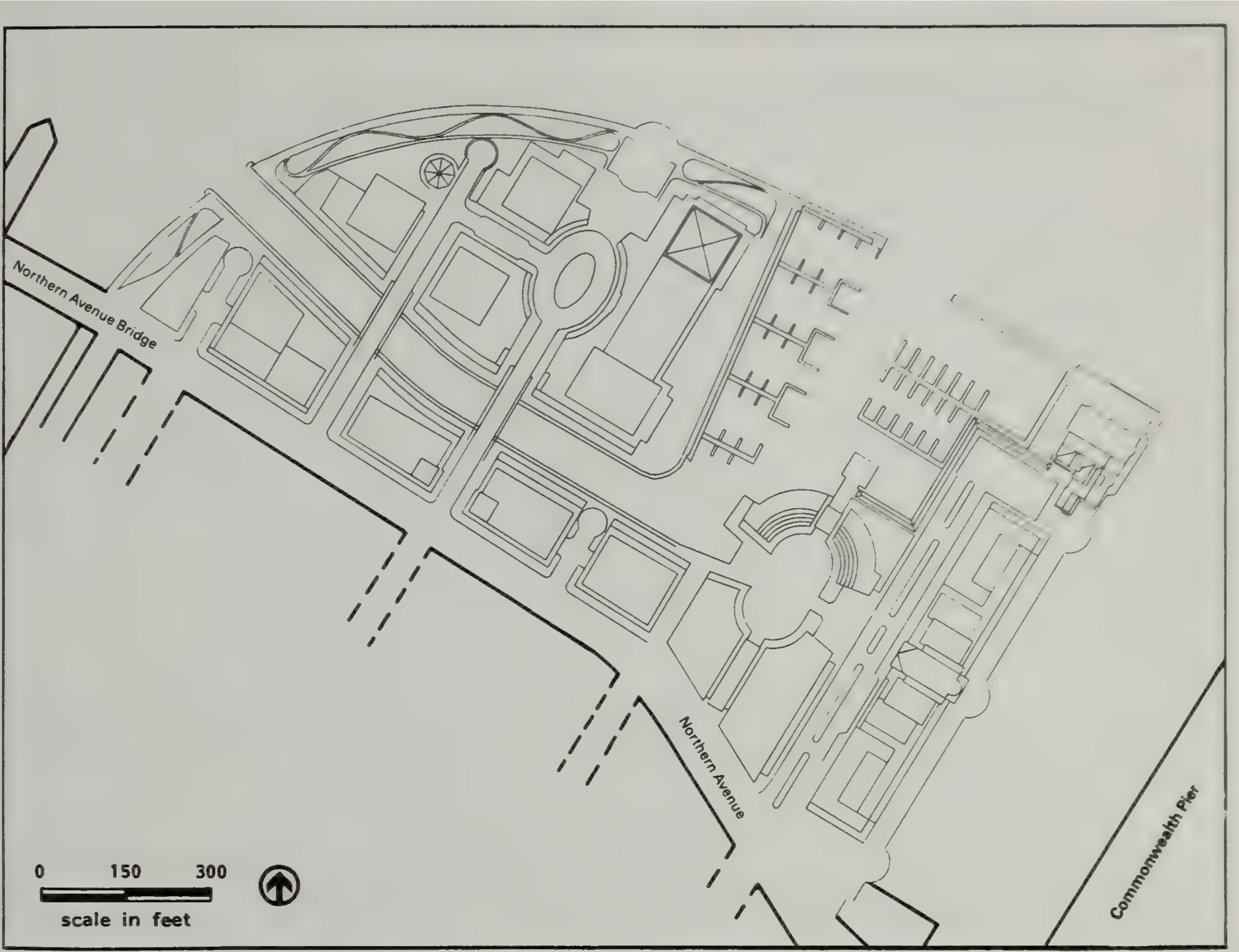
Coast Guard. Meetings are being arranged by the proponent of the Fan Pier Development with the regional office of the U.S. Coast Guard to discuss the status of planning for the proposed Fan Pier canal and bridges.

Massachusetts Historical Commission. The proponents for the Fan Pier and Pier 4 Developments have been in contact with the Massachusetts Historical Commission (MHC) and will continue to consult with the commission as the master plans progress.

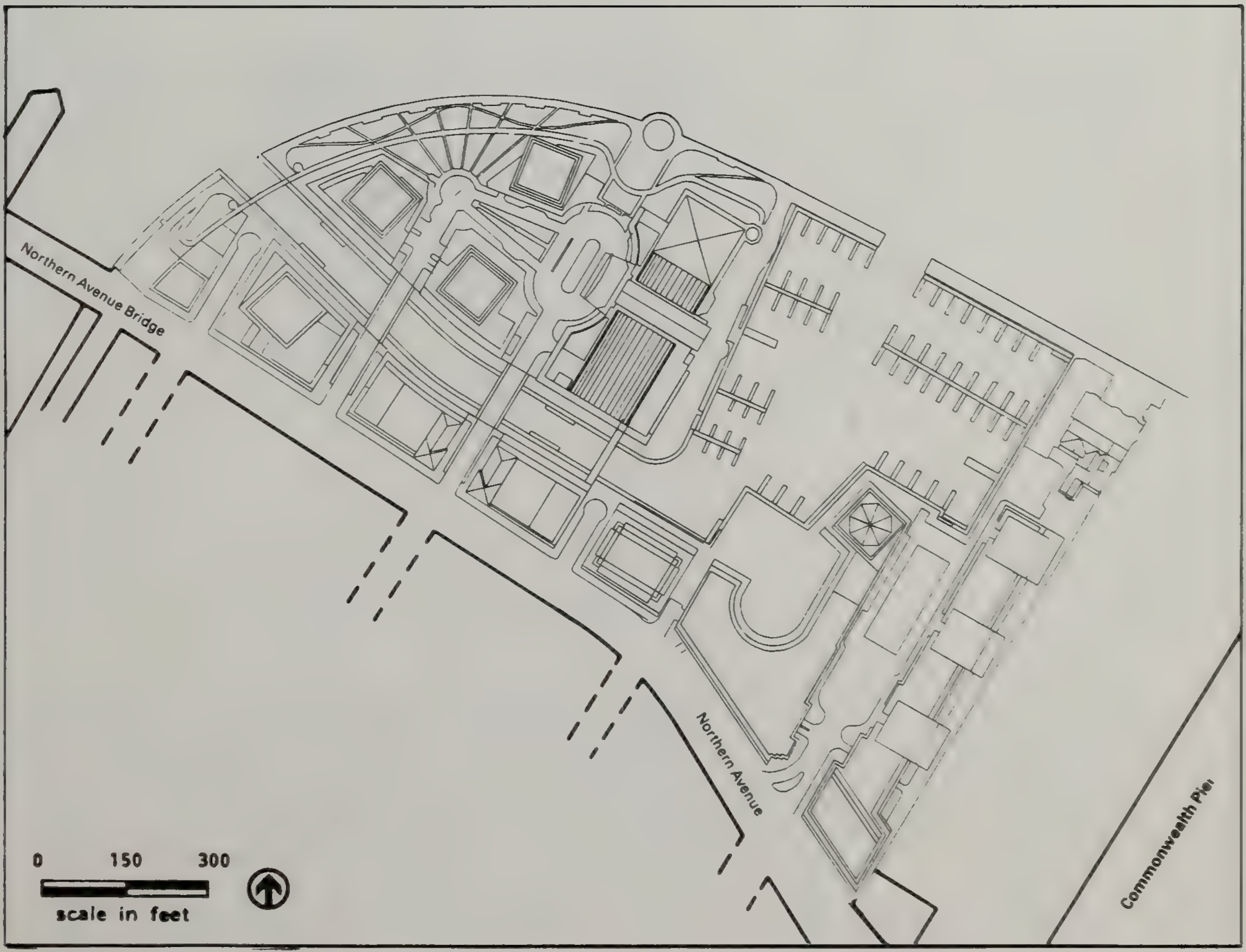
PROJECT DESIGN AND VISUAL IMPACT ANALYSIS

The physical setting and the public policies and guidelines for the Fan Pier and Pier 4 sites create the context for the Fan Pier Development and Pier 4 Development master plans. The goal of these designs is to create projects that express a new vision for this part of the Boston waterfront and relate well to the scale and character of the surrounding urban and waterfront environment. The following discussion more fully describes the urban design intentions of the master plans, and then presents views characterizing the visual experience that will be created by the Fan Pier and Pier 4 master plan alternatives (see Figure V.1-2).

FIGURE V.1-2
Relationship of Fan Pier and Pier 4 Master Plan Alternatives



Initial Proposals



Lesser-Scale Alternatives

■ Fan Pier Development Master Plan

To integrate the Fan Pier Development into the neighboring South Boston area, the South Boston street grid will extend across Northern Avenue onto the site, serving as the principal organizing element of the master plan. Two unique urban design elements will distinguish the Fan Pier Development master plan: a marina to be located in the basin between the Fan Pier and Pier 4, and a canal that will traverse the site linking the new marina to the Fort Point Channel. Urban design elements of the downtown incorporated into the master plan will be enhanced through careful attention to multilevel view corridors, the creation of public open space areas, and the provision of land and waterside facilities that encourage public access.

Fan Pier Initial Proposal

The basic organizational framework for the Fan Pier Development was established in the Initial Master Plan design. Six urban design elements compose this framework: (1) the street grid layout, (2) the canal, (3) the marina, (4) the Fan Pier Harborwalk, (5) changes in ground elevation, and (6) the allocation of uses and building massing. These organizing elements are described below, as they are incorporated into the Fan Pier Development Initial Proposal. Within the framework established by these elements, the master plan design also respects the standards set forth by the Harborpark guidelines.

Street Grid. The extension of Sleeper, Farnsworth, and Pittsburgh Streets onto the site serves as the principal organizing element of the master plan. By connecting the site to the urban fabric of the surrounding South Boston public circulation system, the street grid will clearly define the proposed Fan Pier Development as an integral, accessible part of the city, rather than an isolated fragment. The perpendicular alignment of the street extensions onto the site--relative to Northern Avenue and the water's edge--will frame and focus views out toward the harbor. Since the grid configuration will be composed of smaller block elements consistent with downtown block sizes, the proposed grid will also establish a pedestrian scale on the site. In addition, the formal orthogonal street grid will also serve to contrast, and thereby enhance, the curved Fan Pier shape along the water's edge.

Canal. The new canal will link the marina and the Fort Point Channel, establishing a cross-axis to the north/south orientation of the South Boston street extensions on the Fan Pier site. Designed with public promenades lined with retail uses and devoted to pedestrian circulation and water transportation, the canal will become a new "water street" in Boston. By bringing water into the orthogonal city grid, the canal will also help to create a progression of water edges out to the Inner Harbor waterfront. The canal and its walkways will be an internal, urban waterfront edge complementing the more parklike Fan Pier Harborwalk along the harborfront. Both sides of the canal will be lined by floating docks for mooring boats and pedestrian access. The canal will provide a smaller scale urban waterway for harbor taxis, police boats, and small recreational power boats.

To create a major view corridor framing the Custom House Tower, the axis of the canal bends between Pittsburgh and Farnsworth Streets to align with the historical tower. Two bridges will span the canal, offering spectacular prospects of the downtown across the Fort Point Channel to the west, and to the Pier 4 Development to the east.

Marina. The marina proposed between Fan Pier and Pier 4 will provide secure dockage for recreational boats and create an active maritime focus for the two developments. The marina will serve as a water entranceway from the harbor to the new canal and the Fan Pier Development for recreational boats, water shuttles, and other commercial passenger craft. Approximately 80 slips for recreational boats will be provided on the Fan Pier side of the marina, with at least ten percent of these slips available for transient boaters.

Harborwalk. The Fan Pier segment of Harborwalk will extend along the entire perimeter of the pier from the Fort Point Channel to the new marina. Pedestrians arriving from the downtown or Museum Wharf area will be able to walk along the South Boston edge of the Fort Point Channel, past the commercial passenger boat landing on Fan Pier, to the canal entrance. In order to cross the canal, the Fan Pier Harborwalk route will turn in along the canal promenade to the Farnsworth Street bridge, and then return to the water's edge on the north side of the canal.

Many public open space features will be located along the curved edge of the Fan Pier, adjacent to the Fan Pier Harborwalk route. As the Fan Pier Harborwalk continues along the pier's perimeter toward the marina, it will proceed on a route contiguous to the waterfront park, and then through the open air amphitheater cantilevered over the water near the base of the hotel tower. The waterfront park, defined by the curved edge of the pier and the two nearby residential buildings, will be integrated into the city's Harborpark system, providing an urban park along the waterfront that will direct views to the Inner Harbor and the downtown.

From the amphitheater, the Fan Pier Harborwalk route will continue around the base of the hotel tower to the east side of the pier, becoming a marina boardwalk at the breakwater. The marina boardwalk will extend along the Fan Pier seawall adjacent to the hotel, enlivened by cafes in the warmer months. The walk will then turn in along the canal promenade and cross the canal at the Pittsburgh Street bridge. Continuing along the south side of the canal, the Fan Pier Harborwalk will link with the Pier 4 Harborwalk at the terminus of the Fan Pier canal.

Changes in Ground Elevation. The entire length of the waterfront edge on the Fan Pier site--including Harborwalk, the canal promenade, and the marina boardwalk--will be maintained at a constant elevation, 17 feet above mean sea level (msl), which is the existing ground elevation of the site. Due to the presence of the underground parking structures, the "ground" level for buildings north of the canal will be +27 msl. A grassy berm will slope ten feet up from the Fan Pier Harborwalk along the water's edge to the waterfront park, walkways, streets, and buildings at ground level on the portion of the site north of the canal.

Allocation of Uses and Building Massing. The allocation of the proposed uses on the site embodies the urban design goals of the Fan Pier Development, and serves as one of the principal organizing elements in the master plan design. The massing configurations and locations of the buildings within the street grid organization reflect the allocation of the office, retail/commercial, hotel, residential, and maritime uses on the site.

Office uses will be concentrated on the portion of the site south of the canal along Northern Avenue. Locating the larger-scale office building elements along the more urban edge of Northern Avenue will help to link the proposed development to the commercial land uses and building forms characteristic of downtown Boston. The new canal will establish an active, pedestrian-oriented corridor, joining the downtown waterfront west of the Fort Point Channel with the Pier 4 Development open space plaza to the east. Residential uses will be located on the portion of the site north of the canal, raised ten feet above the water's edge. These residential units will be housed within building forms that are set back from the waterfront, atop low-rise base structures. The hotel building, with water on three sides and an urban plaza on the fourth, will provide a transitional element between the residential uses and the public marina. Maritime uses, including the marina, canal, commercial passenger boat landing, and accompanying landside facilities, will be dispersed along the water's edge throughout the Fan Pier site. This allocation of uses in the Initial Master Plan Proposal will ensure that the Fan Pier Development will be active during both the day and evening.

The massing configuration of the Fan Pier Intitial Master Plan reflects the distribution of the proposed development's program of uses on the site, while respecting the site's urban design context and the goals and guidelines established for waterfront development in Boston. The orthogonal street grid pattern and the canal alignment will create view corridors directed out to the Inner Harbor and across the Fort Point Channel to the downtown. To respect the lower scale of the waterfront, the building massings, with the exception of the hotel, will step back away from the water's edge so that the taller building elements will be located along the more urban edge of Northern Avenue. The hotel tower will serve as a landmark for this area of the South Boston Inner Harbor waterfront at the mouth of Fort Point Channel. The changes in ground elevation proposed by the Initial Master Plan will help to establish the territories of pedestrian and vehicular circulation. As described in Chapter V.5, Public Access, approximately one half of the site will be devoted to public open space, including the continuous Fan Pier Harborwalk along the harbor's edge. Water-dependent uses will also be integral components of the Fan Pier Development Master Plan, as discussed in Chapter V.6, Water-Related Activities.

Fan Pier Lesser-Scale Alternative

In order to incorporate public review comments and meet the requirements of the MEPA scope, a Lesser-Scale Alternative to the Initial Master Plan Proposal was developed for Fan Pier. This Lesser-Scale Alternative is characterized by a reduction in programmatic area and modifications to the massing configuration, while retaining the basic framework established in the Initial Proposal.

Street Grid. With the Lesser-Scale Alternative, the extension of the South Boston street grid onto the site will not be significantly altered from the Initial Proposal. However, the street north of the canal that will link the terminus of Pittsburgh Street to the cul-de-sac at the end of Farnsworth Street will be expanded into a pedestrian-scaled boulevard with a triangular, landscaped urban park in the center.

Canal. In the Lesser-Scale Alternative, the canal promenade will be widened to further facilitate tree plantings and pedestrian movement along the canal edge. This enhancement of the pedestrian environment will be accomplished by narrowing the canal slightly, without affecting the passage of boats.

Marina. The concepts for the marina proposed for the Fan Pier Initial Proposal will not change with the Lesser-Scale Alternative, however the layout of the marina will be modified to provide improved facilties.

Harborwalk. To maintain the Fan Pier Harborwalk route close to the water's edge, pedestrian bridges will be located at both ends of the canal in the Lesser-Scale Alternative. These pedestrian bridges will allow a more continuous path along the harborfront, so that the Initial Proposal's "detour" along the canal promenades to the Farnsworth and Pittsburgh Street bridges will become an optional waterfront route for the Fan Pier Harborwalk in the Lesser-Scale Alternative.

Changes in Ground Elevation. The changes in the ground elevation proposed for the Fan Pier site with the Initial Proposal will remain the same with the Lesser-Scale Alternative.

Allocation of Uses and Building Massing. The program of uses proposed for the Fan Pier Development with the Lesser-Scale Alternative reflect a net reduction of approximately 139,000 s.f., resulting from decreases in the programmatic area of retail, hotel, and residential uses. These reductions in program will also be reflected in modifications made to the master plan's massing configuration. The amount of retail and residential space on the portion of the site north of the canal will be reduced to further respect the lower scale of the Inner Harbor waterfront. The height of the residential building closest to the harbor will be significantly reduced, while the height of the residential building along the north side of the canal near Fort Point Channel will also be reduced. Two of the office buildings along Northern Avenue will increase in height to reflect a reallocation of office space to the buildings south of the canal, although the total amount of office space in the Fan Pier Development will not change with the Lesser-Scale Alternative. By consolidating the hotel space into a single tower of taller, more slender proportions, the hotel will become a marker for this prominent location on Boston's waterfront. These modifications to the building heights will demonstrate a more pronounced step back from the harborfront.

Other modifications to the massing configuration will be made to all of the base structures of the proposed buildings. The tower elements atop the base structures will be set back from the street edges of the bases. The base structures will maintain a uniform height of 75 feet to reinforce the pedestrian scale of the site, and the base edges will align with the orthogonal street grid. The buildings located along the north side of the canal will be adjusted to align with the axis of the canal and the water's edge.

The modifications to building heights and massing configurations proposed for the Fan Pier Lesser-Scale Alternative further respond to goals and guidelines for waterfront development and to public concerns expressed during the on-going review process.

■ Pier 4 Development Master Plan Design

The design objective of the Pier 4 Development Master Plan is to establish a new urban identity for Pier 4 that will complement the scale and character of the adjacent Fan Pier Development and provide an impetus to the future vitality of the South Boston waterfront. Figure V.1-2 depicts the relationship of the development alternatives for the two projects. The major urban design elements of the Pier 4 mixed-use master plan are intended to encourage both land and water-based uses that will be accessible to the public, as well as to extend view corridors out to the harbor.

Pier 4 Initial Proposal

The Initial Master Plan Proposal for the Pier 4 Development is organized along two perpendicular axes. One axis reinforces the linear form of the pier, while the cross axis responds to the alignment of the Fan Pier canal. The mixed-use/hotel building, sited along the eastern edge of the pier, has the same orientation as the neighboring Commonwealth Pier 5 building and other traditional pier structures on the Inner Harbor. The large central arcade in this building extends the cross axis established by the Fan Pier canal out to the eastern edge of Pier 4. This arcade links the pierwalk, a pedestrian walkway that follows the water's edge along the eastern length of the pier, with the public common, an oval-shaped landscaped plaza that serves as a terminus to the Fan Pier canal.

The public common will open out toward the canal, and will also be accessible from covered walkways along the buildings that define the common. The end of the common opposite the Fan Pier canal will open toward the single Pier 4 roadway and the central arcade of the hotel building.

Vehicular access and circulation will be confined to the central roadway. This entrance roadway will also serve as a major view corridor to the harbor. The perimeter of Pier 4 will be incorporated into the city's Harborwalk along the waterfront, providing continuous public access in the form of a waterfront promenade along Pier 4's entire perimeter, except at the end of the pier behind Anthony's Pier 4 Restaurant. The design of the Pier 4 Harborwalk will follow the Harborpark guidelines, providing many public amenities such as open viewing areas of the marina basin and Inner Harbor. Segments of the walkway will be protected by a free-standing canopy and retail arcades. Maritime uses in the Initial Proposal are concentrated in the marina, which is proposed for joint development with Fan Pier.

The Initial Master Plan Proposal will provide other pedestrian-oriented areas in addition to the Pier 4 Harborwalk and the public common. Sheltered arcades, lined with retail uses, restaurants, and cafes, will be located in the building connecting Northern Avenue to the public common on the south side of the site, and in the buildings linking the public common to the marina. As in the Fan Pier Development, all parking will be located below grade, benefitting the character and quality of the public open space.

The building masses along Northern Avenue will be taller than those near the water, responding to the more urban character of the street edge. In addition, the buildings on the north side of the public common will be lower than the hotel building along the eastern edge of the pier and the two buildings along Northern Avenue, allowing views of the harbor and city skyline from the taller buildings. Views toward the downtown from the Commonwealth Pier Headhouse will include the hotel building sited parallel to Pier 5, buildings along Northern Avenue, the Boston Wharf Company buildings, and the city skyline across Fort Point Channel and the Inner Harbor in the background.

Pier 4 Lesser-Scale Alternative

The Lesser-Scale Alternative for the Pier 4 Development responds to the specific concerns identified by the design review process to date, to better complement the Fan Pier Development Master Plan and further respect the site's waterfront context. The Lesser-Scale Alternative retains some of the major features included in the Initial Master Plan, such as the marina, provision for public open space, and the Pier 4 Harborwalk.

The massing configuration of the Lesser-Scale Alternative will incorporate linear forms typical of traditional pier structures. The building heights will be generally lower than those in the Initial Proposal, especially along the deep water slip between Pier 4 and Commonwealth Pier 5. In addition, the building heights proposed in the Lesser-Scale Alternative will step back from the water's edge at a scale more appropriate for the harborfront.

The hotel/condominium tower will be designed to relate to the scale of the adjacent marina. This tower element will complement the Fan Pier Lesser-Scale Alternative hotel tower and serve to make the marina basin the focal point of the combined developments. To align with the existing retaining wall that defines the marina's edge, the tower will be rotated somewhat from the orthogonal alignment of the rest of the buildings.

The curved base structure of the hotel building and the open space plaza it will form define a nucleus for the Pier 4 Development, as well as a terminus for the Fan Pier canal. In the Lesser-Scale Alternative, the public plaza on Pier 4 will be expanded, opening views to the canal and across the marina to the harbor. An additional open space in the center of the site will be highlighted by a water feature located between the hotel and residential buildings that will bring a sense of water into the site.

Both to break the repetition in the massing of the Fan Pier and Pier 4 Development office towers along Northern Avenue and to admit light into the public plaza at the end of the Fan Pier canal, the retail/office building that joins the base of the hotel tower and extend back to Northern Avenue will be held at a a height of seven stories. All of the building masses proposed for the Pier 4 Development in the Lesser-Scale Alternative will incorporate this seven-story base element, setting the higher tower elements back and away from the street edge to help reduce the overall scale of the buildings.

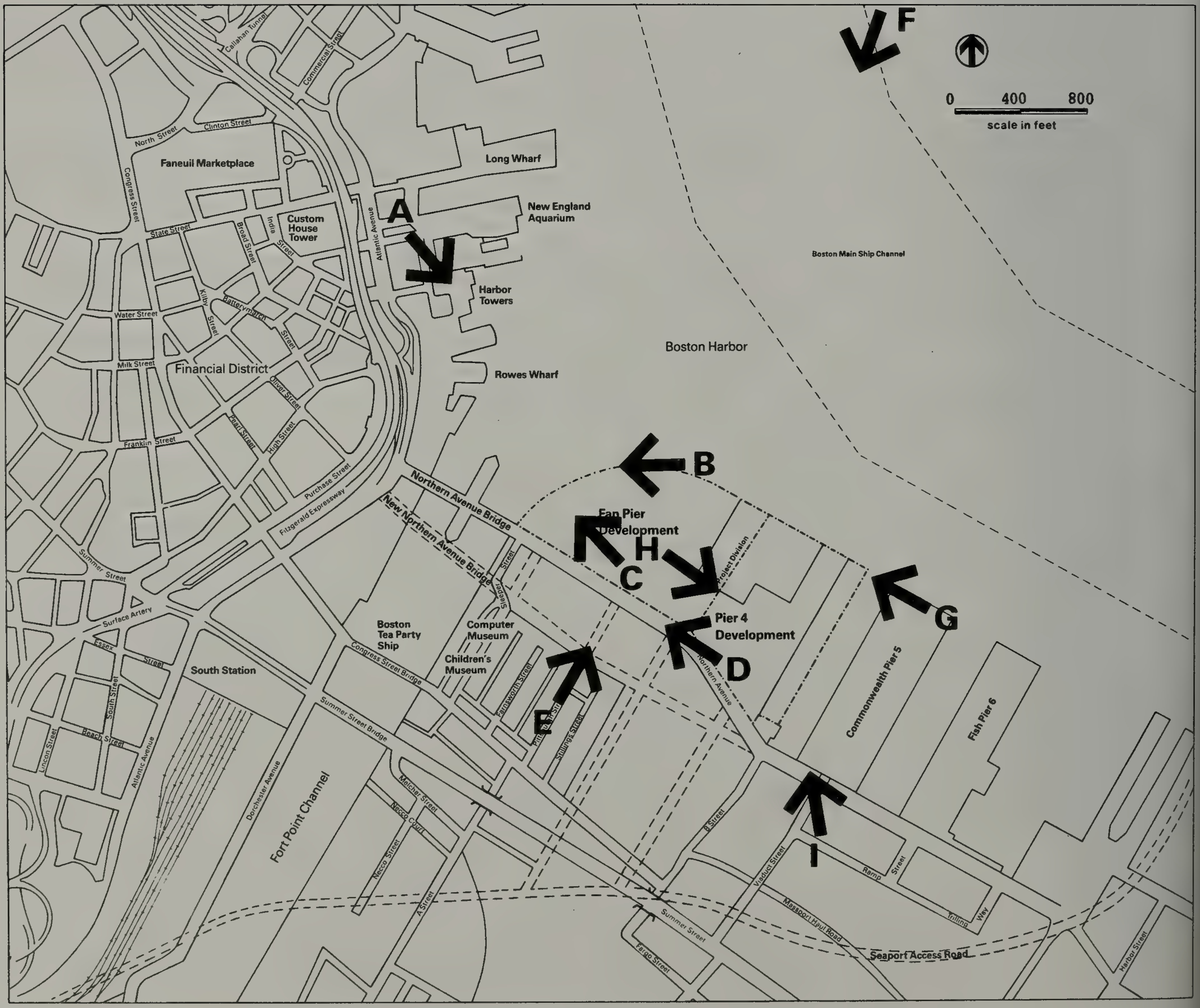
Vehicular access to the Pier 4 Development will occur from Northern Avenue and from a Seaport Access connector road into the site. Vehicular access on the site will extend to the end of the pier where Anthony's Pier 4 Restaurant is located. However, vehicles will be deliberately discouraged from penetrating the site since the underground parking and service entrances will be located close to Northern Avenue.

Views from Commonwealth Pier 5 toward the downtown area will include the Pier 4 and Fan Pier Developments in the foreground. Views from the Headhouse will include the residential building along the length of Pier 4 opposite Commonwealth Pier, the Boston Wharf Company buildings, and the Fort Point Channel area skyline in the background.

■ Visual Impact Analysis

The following sketches and discussion describe the urban design characteristics of the Fan Pier Development and Pier 4 Development Master Plan Alternatives, and identify any urban design impacts on the visual environment likely to result from the proposed projects. These effects are described through nine pedestrian-level views taken from locations in South Boston, downtown, across the harbor, and within the Fan Pier and Pier 4 Developments. Each set of views compares the existing condition (No-Build) with the Initial Master Plan Proposals and the Lesser-Scale Alternatives. These views are based on computer-generated, three-dimensional visual modeling from set distances along specific view corridors to produce an accurate representation of what would actually be experienced by the viewer. Views of existing conditions include the Rowes Wharf and International Place developments, currently under construction. The accompanying map (Figure V.1-3) identifies the locations from which each of the nine views was taken.

FIGURE V.1-3
Views
Analyzed



These visual studies are based upon the level of information available from the master plans. Detailed information about the design of the building facades is not yet available. The building masses illustrated on the following pages will undergo refinement, although their basic characteristics--location, height, and building footprint--will remain approximately the same. For the purposes of this visual analysis, an important simplifying assumption has been made--that is, the master plan massing configurations are assumed to be the actual forms of the buildings that are to be designed. Design features have been added to the views in order to enhance understanding of the scale of these buildings, and the relationships of these buildings to each other, to new public open spaces and other amenities, and to the area context. Facade features of buildings (e.g., windows, textures, storefronts) and site amenities (e.g., parks and open space, bridges, landscaping) have also been added to these visual studies to add a sense of scale and to express the master plan goals for the two projects. The facade features do not express a specific architectural design intent for the projects.

The urban design elements used as criteria to evaluate the visual characteristics of the proposed Fan Pier Development and Pier 4 Development Initial Master Plan Proposals and Lesser-Scale Alternatives include:

- Height
- Scale
- Massing
- Connections/Linkage (physical, visual, image)
- View Corridors
- Public Accessibility
- Pedestrian Movement/Activity.

View A

Fan Pier and Pier 4
from Aquarium Wharf

Existing View

Standing on the New England Aquarium Wharf, the Fan Pier and Pier 4 sites appear as a low band along the edge of the Inner Harbor in the center of this view. The industrial buildings of South Boston form the horizon, with the long form of the Commonwealth Pier 5 building to the left. One of the high-rises in the Harbor Towers residential complex appears in the right foreground, as does the northern pier building of the Rowes Wharf development.

Initial Proposals

In this view, the Initial Master Plan Proposals for the developments appear as a relatively uniform and massive group of buildings composed primarily of the Fan Pier Development buildings in the foreground, with the Pier 4 Development behind. A simple and consistent order of building scales can be distinguished--towers of two general sizes and a consistent base height used throughout the two developments, with the Fan Pier hotel as the landmark. All buildings exhibit the same orientation, reflecting the coherent grid of the neighboring South Boston orthogonal street system extended onto the sites. The large, landscaped waterfront park and other public open space amenities are suggested by this view, with the pavilion structure in the Fan Pier waterfront park highlighted as a particular point of interest.

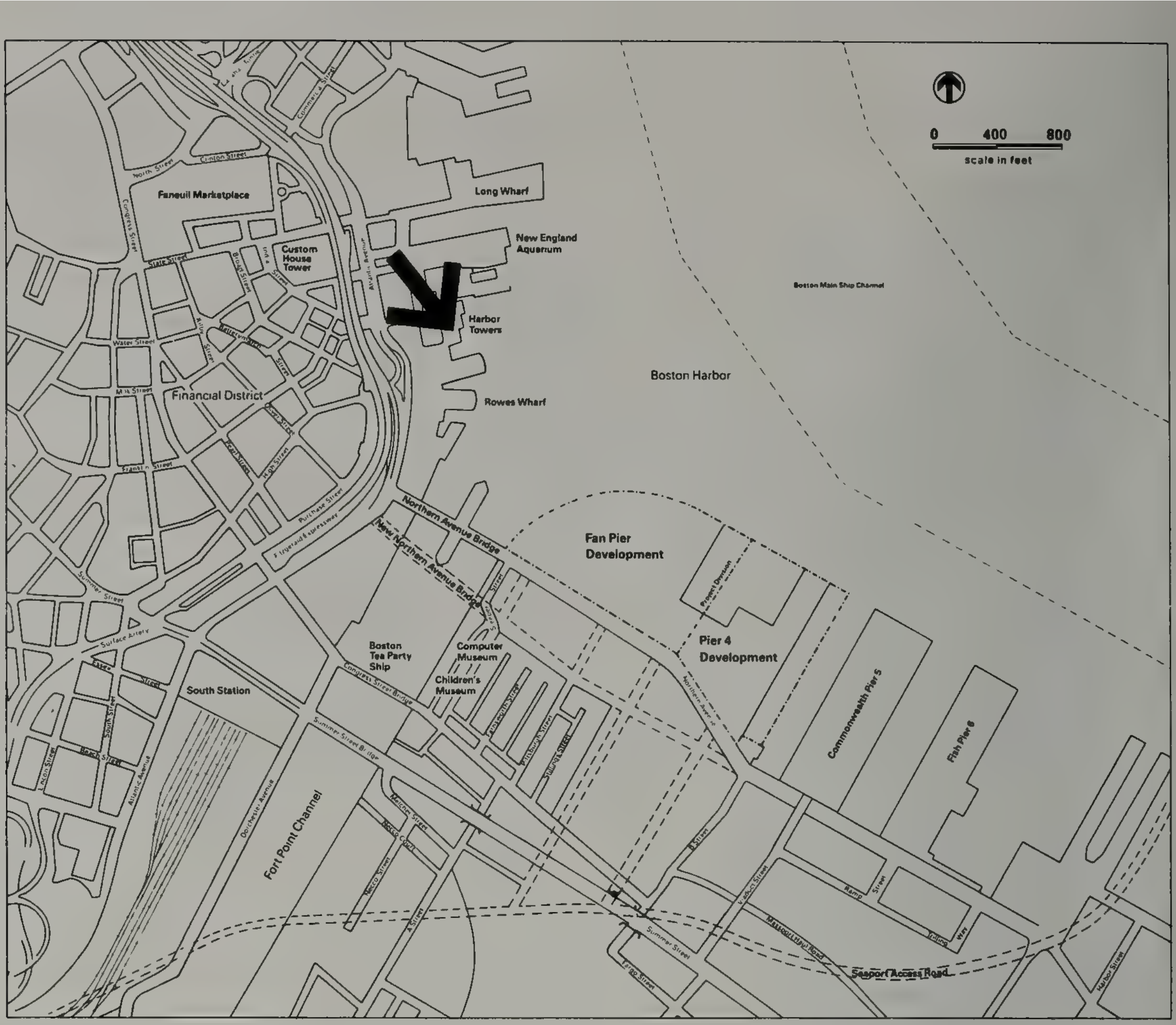
This layered view articulates the integration of the various urban design elements that comprise the context of the Fan Pier and Pier 4 waterfront developments. Pedestrian promenades and landscaped open space along the water's edge, mid-rise towers atop relatively uniform, lower-scale base structures, and the high rise elements of the Fan Pier hotel and downtown buildings demonstrate the ranges in scale that have been incorporated into the master plan designs. The layered relationship between these various urban design elements will also be apparent from a variety of viewing locations, helping to unify Boston's Inner Harbor waterfront as intended by Harborpark and other goals and guidelines for Boston's waterfront.

Lesser-Scale Alternatives

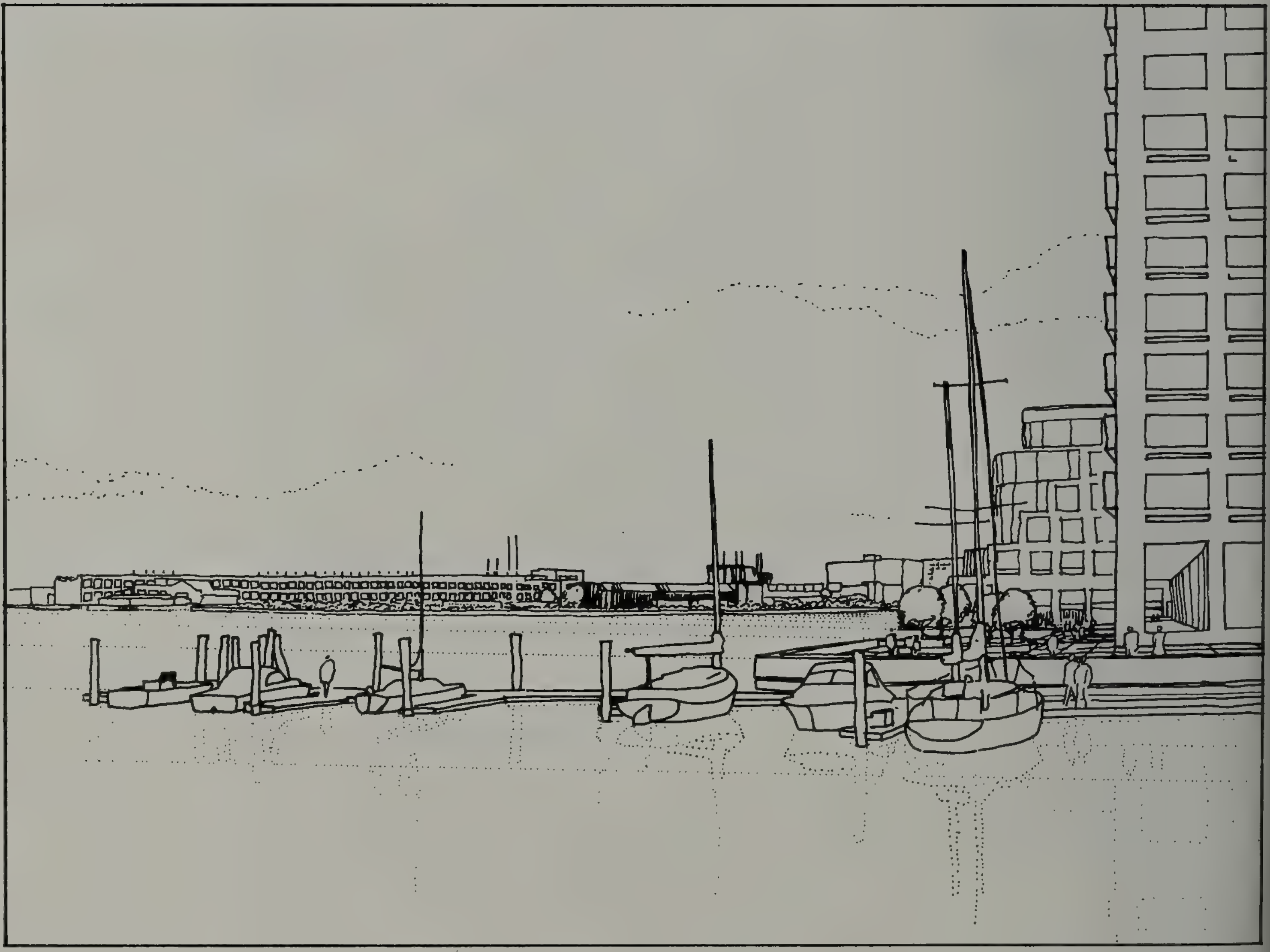
Generally lower massing along the water's edge, as contrasted by the taller Fan Pier hotel tower, distinguishes the Lesser-Scale Alternatives from the Initial Proposals in this view. A greater variety of building sizes, shapes, and orientations compose the Fan Pier and Pier 4 Development Lesser-Scale Alternatives. This massing configuration provides a general sense of openness by reducing the bulky massing of the tower elements of both developments in the Initial Proposals. Building facades appear at various angles to the viewer, reflecting light differently and adding a richness to the composition. The stepping back of the tower masses away from the water's edge, and the use of a relatively uniform scale of base structure in the Lesser-Scale Alternatives, as compared to the Initial Proposals, is more apparent in this view.

The pedestrian bridge, introduced in the Fan Pier Development Lesser-Scale Alternative at the western end of the canal, appears in the right-hand side of the view. The extensive land- scaping along the water's edge and the inclined landform of the berm in the waterfront park on Fan Pier are integrated into Harborwalk and provide a unifying element of public open space along the Inner Harbor waterfront.

VIEW A

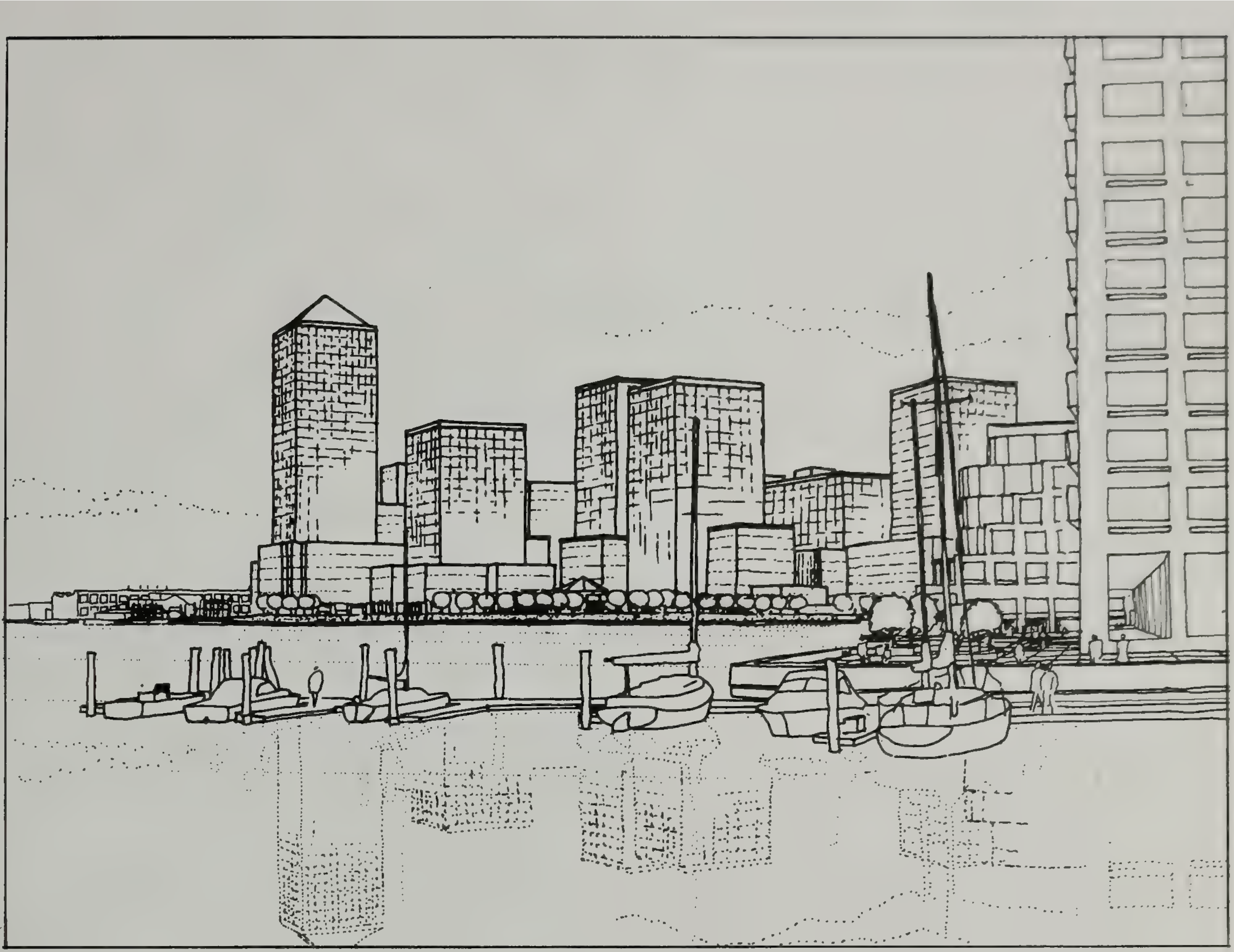


VIEW A
Existing

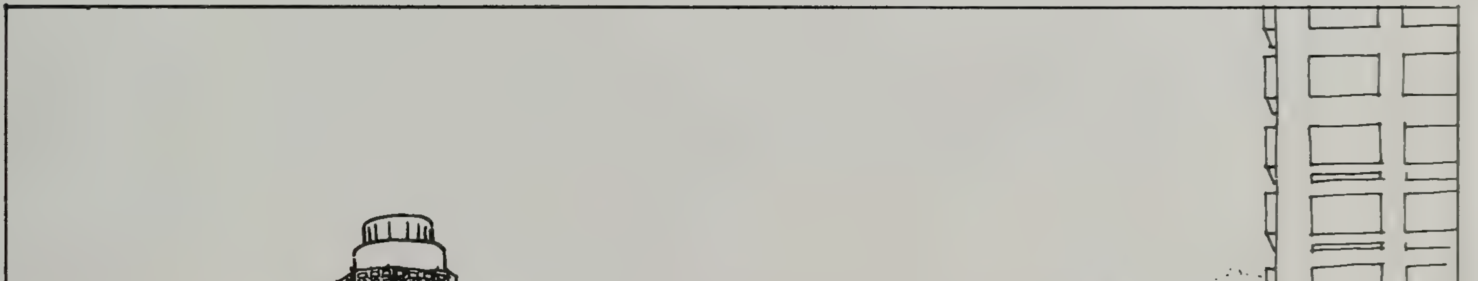


Existing view includes the Rowes Wharf Development, currently under construction.

VIEW A
Initial Proposals



VIEW A
Lesser-Scale Alternatives



Project views are based on Master Plan data. Architectural facade treatment is provided for scale only.

View B

Fan Pier and Downtown
Boston from the
Fan Pier Harborwalk

Existing View

This view is taken from the curved outer edge of Fan Pier, looking toward the downtown across Fort Point Channel. While the parking lot on the Fan Pier detracts from the foreground, the skyline of downtown Boston rising above the mouth of Fort Point Channel makes this a spectacular view. The Financial District towers form the city skyline, while Harbor Towers, Rowes Wharf, and International Place, now under construction and shown as completed projects, frame the right side of this view.

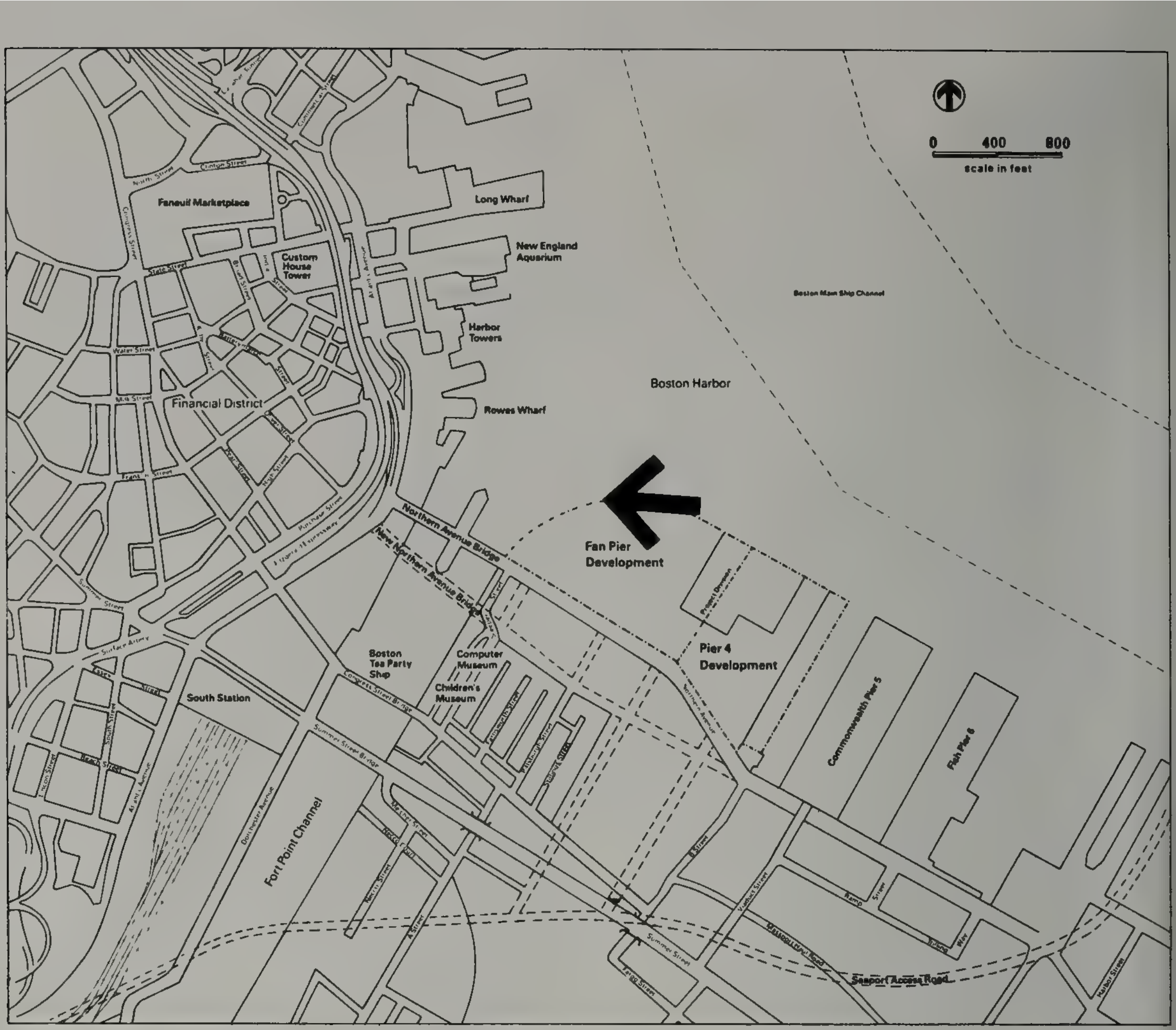
Initial Proposal

Standing along the Fan Pier Harborwalk promenade at the water's edge, this view provides a sweeping panorama of downtown Boston and its urban waterfront. The gently curving pathway edge reflects the outline of the original Fan Pier shape, directing the eye towards the Fort Point Channel. The sloping terrain and winding pathways allow the pedestrian a range of paths to move along the pier edge, and a variety of vantage points from which to view the harbor and its many waterborne activities. Formally arranged tree plantings reinforce the sweep of the pier edge, while lower plantings provide variety along the walkway borders. Other public pedestrian amenities such as railings, landscaping, and lighting also emphasize the curved edge of the pier. The trees soften the effect of the large buildings to the left of the view, enhancing the waterfront park for public enjoyment. The pavilion shown on the left is proposed as an enclosed space for public activities.

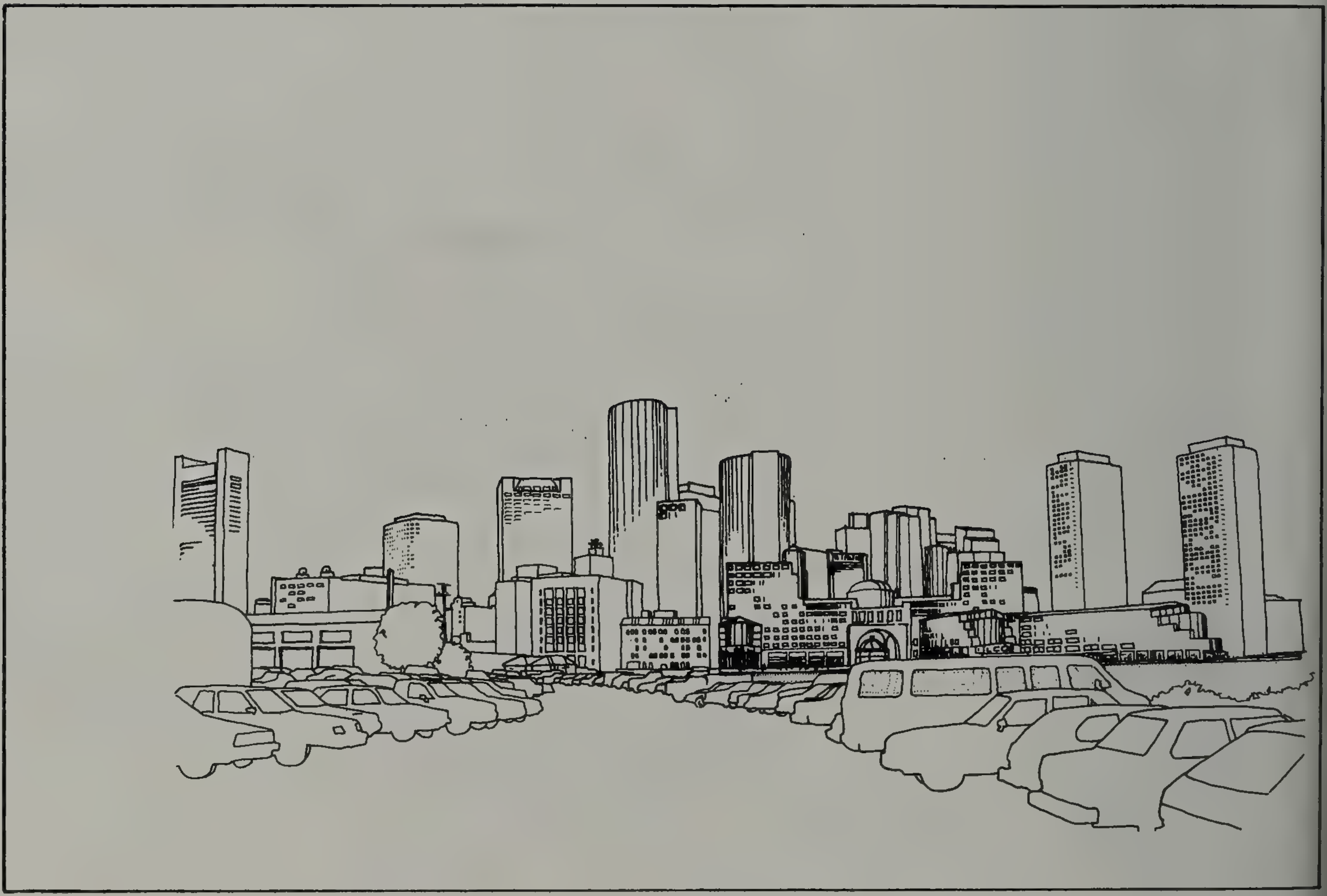
Lesser-Scale Alternative

Prospects from the Fan Pier Harborpark in the Lesser-Scale Alternative appear much the same as in the Initial Proposal. Areas for seating have been added along the water's edge to allow for passive uses, such as viewing the city's downtown and waterfront skyline, watching passersby, or eating lunch. The radial pattern of pathways directs the eye and the vista up into the open space of the park to the left. The addition of a low base massing to the residential buildings (on the left) and the reduction of the overall height of these buildings strengthens the sense of a pedestrian scale and broadens the vista.

VIEW B

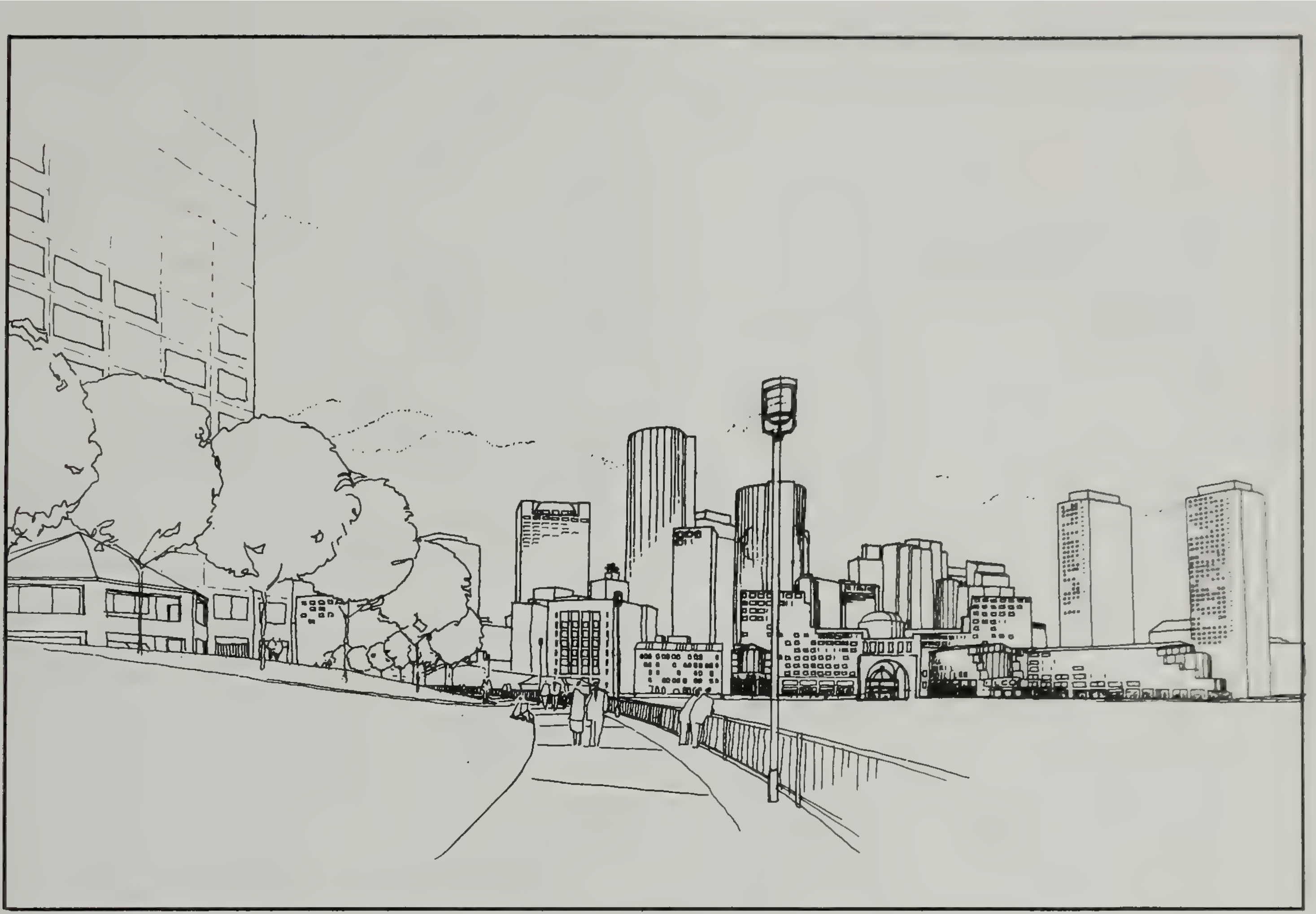


VIEW B
Existing

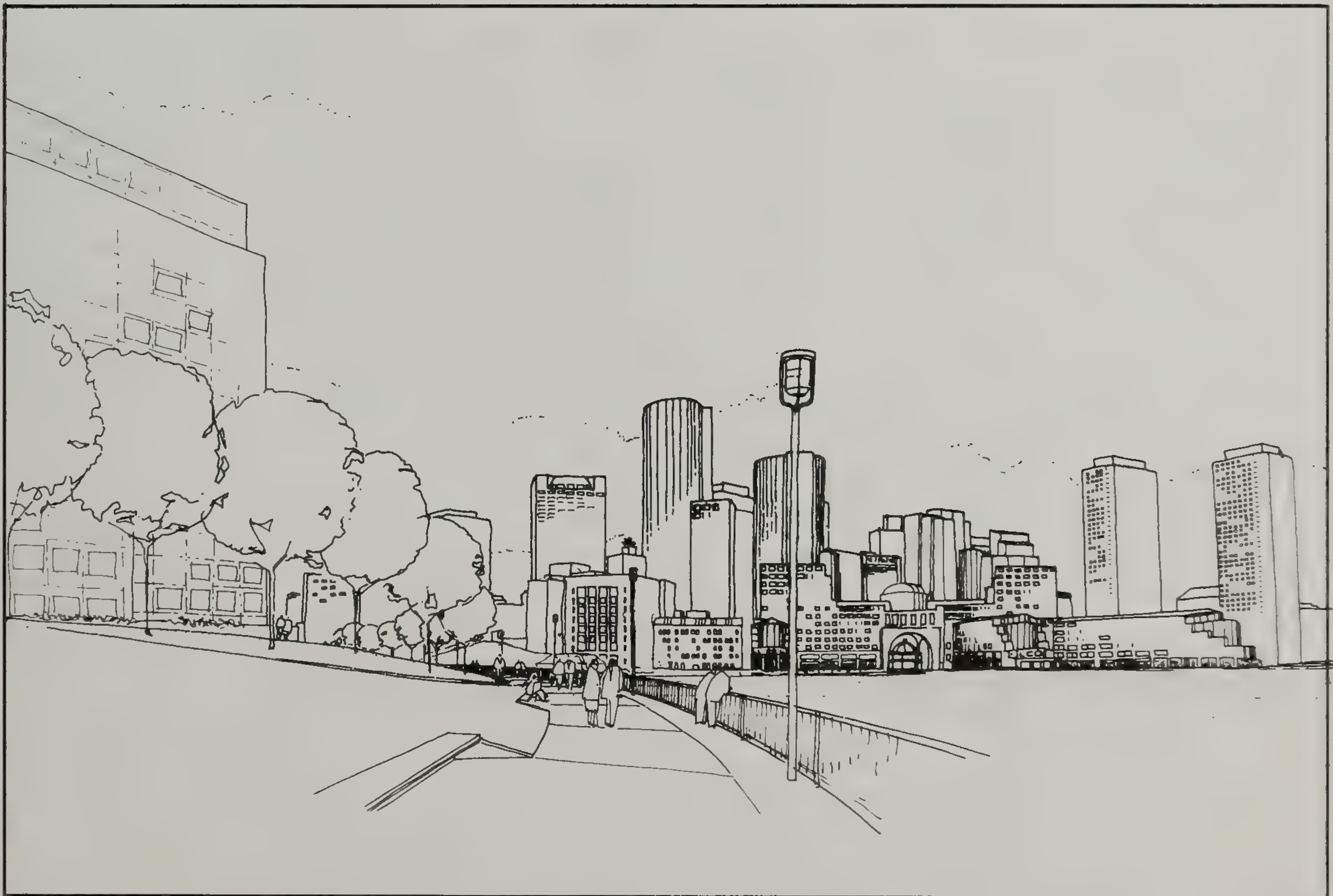


Existing view includes the Rowes Wharf and International Place Developments, currently under construction.

VIEW B
Initial Proposals



VIEW B
Lesser-Scale Alternatives



Project views are based on Master Plan data. Architectural facade treatment is provided for scale only.

View C

Fan Pier Canal and
Downtown Boston from
Fan Pier Farnsworth
Street Bridge

Existing View

From the interior of Fan Pier, this view toward the downtown focuses on the landmark Custom House Tower with the commuter parking lot dominating the foreground. While the densely-packed image of the Financial District forms a dramatic backdrop, no impressions of the water's edge are suggested along either the Fan Pier or downtown waterfront. This view encompasses a sweep of the Financial District and the downtown waterfront, from the Bank of Boston building to the Aquarium. Two projects--International Place and Rowes Wharf, now under construction--will dominate the center of the view.

Initial Proposal

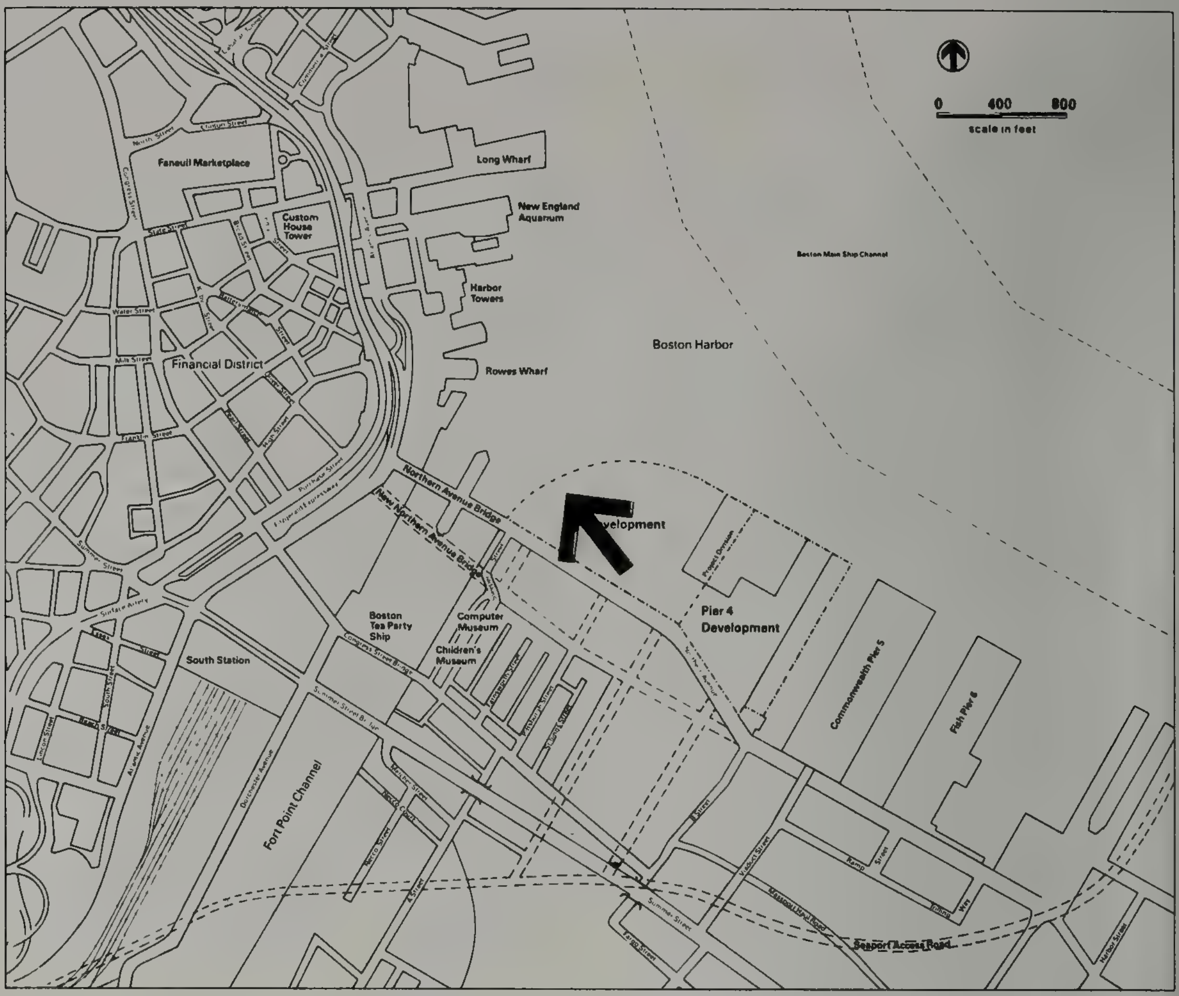
Standing above the new canal in the center of the Farnsworth Street bridge, this view is directed toward downtown Boston across the mouth of Fort Point Channel. The historic Custom House Tower immediately establishes a spatial reference point through its unique location and shape.

The regularly spaced trees and retail arcades of the canal walk create a special urban boulevard along the new canal. The consistent, low scale of the bases of the buildings lining the canal helps to maintain a pedestrian scale along the water's edge with the larger masses of the towers stepping up and away from this edge. Floating docks line the canal, providing direct pedestrian access to the water.

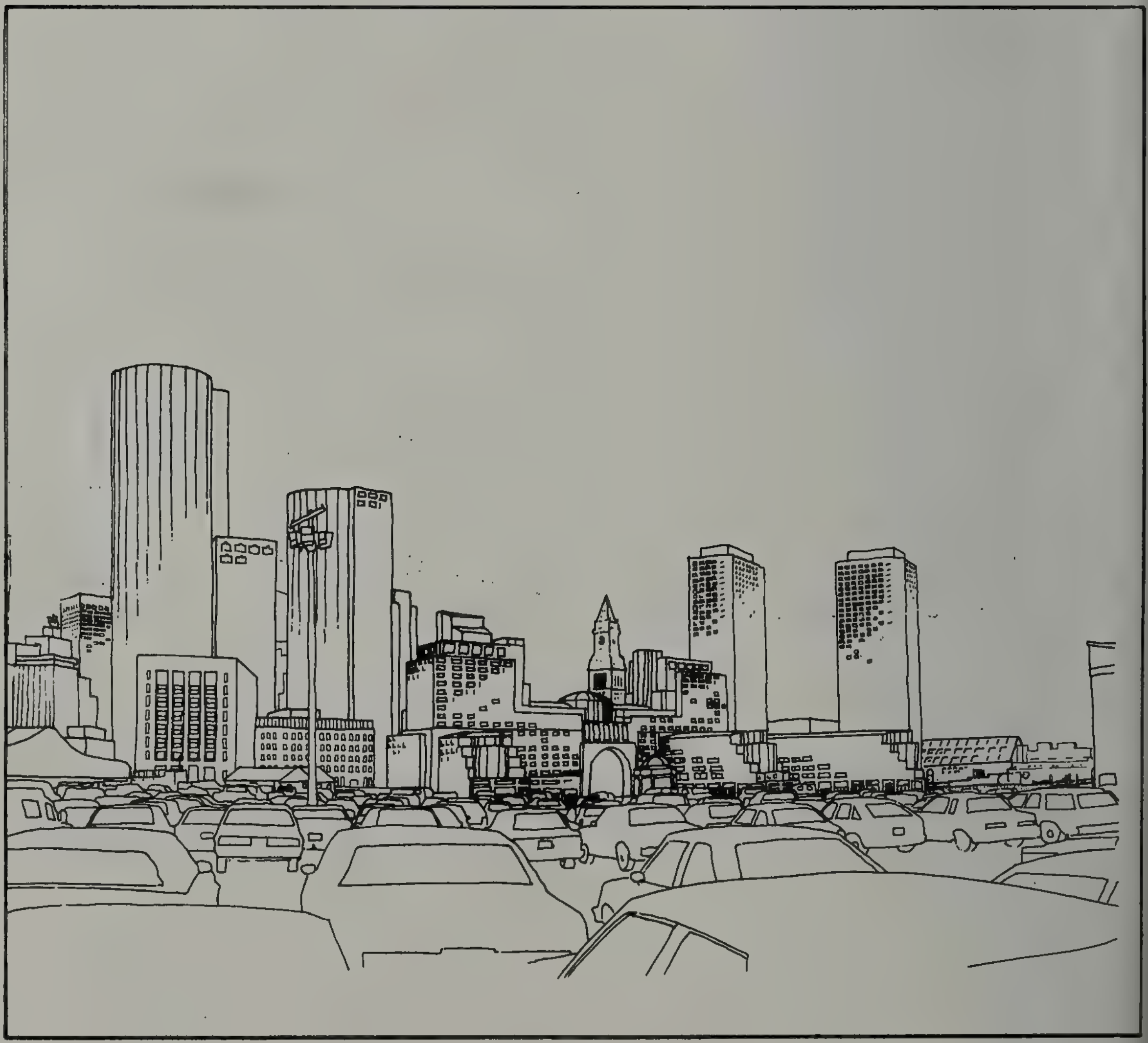
Lesser-Scale Alternative

The view down the new Fan Pier canal in the Lesser-Scale Alternative does not change significantly from the view in the Initial Proposal, as described above. The articulation of the bases of the buildings along the canal further reduces the scale of massing to better relate to the pedestrian-oriented canalwalk activated by retail arcades. Reinforcing the pedestrian orientation of the new canal and the Fan Pier Harborwalk along the Inner Harbor waterfront, a new pedestrian bridge over the western end of the canal was added, as shown in this view. Although this pedestrian bridge obstructs a portion of the view to the downtown waterfront, it provides more continuous pedestrian and handicapped access along the perimeter of the Fan Pier. In addition, this bridge will provide closer pedestrian views of the Inner Harbor and Fort Point Channel from an elevated vantage point along the Fan Pier Harborwalk. For waterborne visitors to the Fan Pier Development, this pedestrian bridge will serve as a gateway to the new canal.

VIEW C

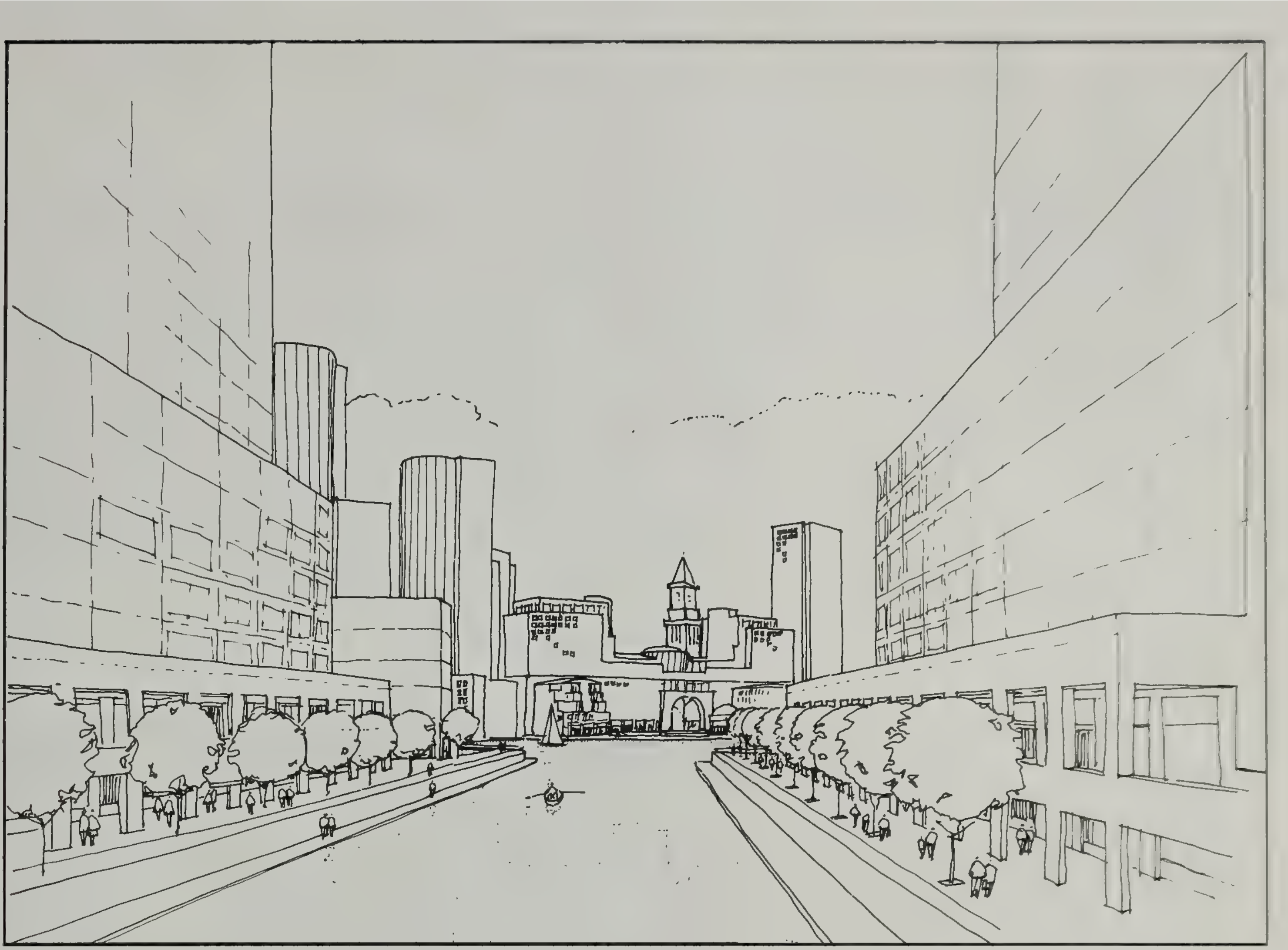


VIEW C
Existing

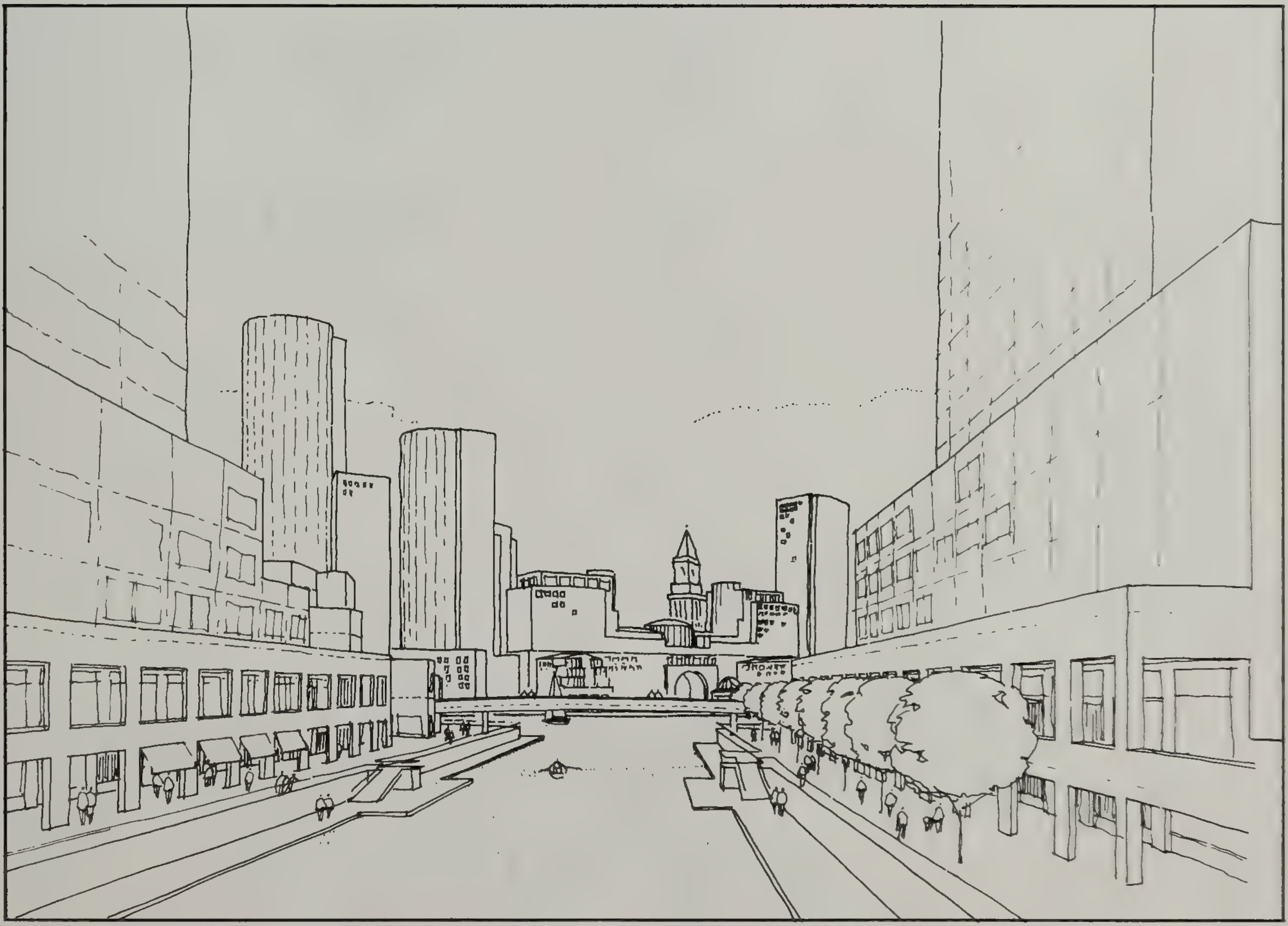


Existing view includes the Rowes Wharf and International Place Developments, currently under construction.

VIEW C
Initial Proposals



VIEW C
Lesser-Scale Alternatives



Project views are based on Master Plan data. Architectural facade treatment is provided for scale only.

View D

Downtown Boston
and Fan Pier from
Northern Avenue

Existing View

This view along the bend of Northern Avenue near Pier 4, looking toward Fort Point Channel and downtown, shows the roadway lined with parked buses, trucks, and cars, and a mixture of low buildings, including a small seafarers' chapel, Our Lady of Good Voyage, in the center foreground. The high-rise buildings that define the edge of downtown Boston closest to the site--from the Federal Reserve building to the left and the historic Custom House Tower to the right--bracket the background view. The flat parking area stretching towards the city on the right side of the view covers most of the Fan Pier site.

Initial Proposal

With the Initial Proposal for the Fan Pier and Pier 4 Developments, Northern Avenue will become more of an urban street along the north side, as shown in this view. The building configurations of proposed urban-scale development south of Northern Avenue are not yet known. By providing a consistent, lower base for the buildings along Northern Avenue, a lower-scale facade is implied along the street edges. The scale and proportion of these bases are reminiscent of the industrial and commercial structures, such as the Boston Wharf Company buildings, which are typical of this area of South Boston; examples of such buildings appear in the left portion of the view.

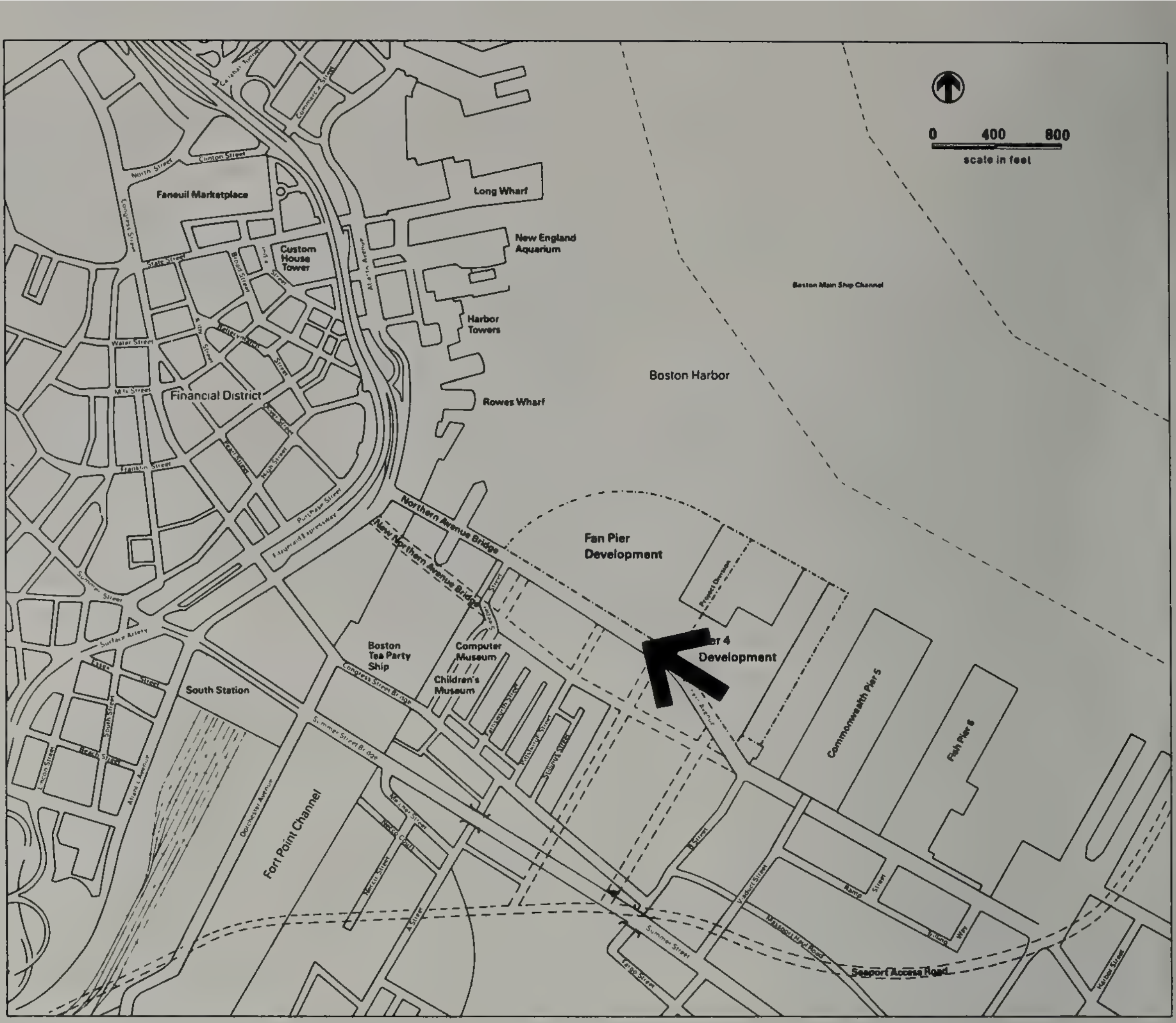
With the use of building materials complementary to the brick and masonry facades of the district, a more unified, urban character can be achieved by the proposed developments. Breaks in the Fan Pier Development building masses along Northern Avenue occur at Sleeper, Farnsworth, Pittsburgh, and Stilling Streets, and at the entrance to the Pier 4 Development. These spaces help to preserve view corridors and public access to the waterfront, while reducing the "wall-effect" along Northern Avenue. The uniform base and tower heights, and the alignments of the buildings along Northern Avenue, emphasize the linearity of Northern Avenue and its character as an urban street.

Lesser-Scale Alternative

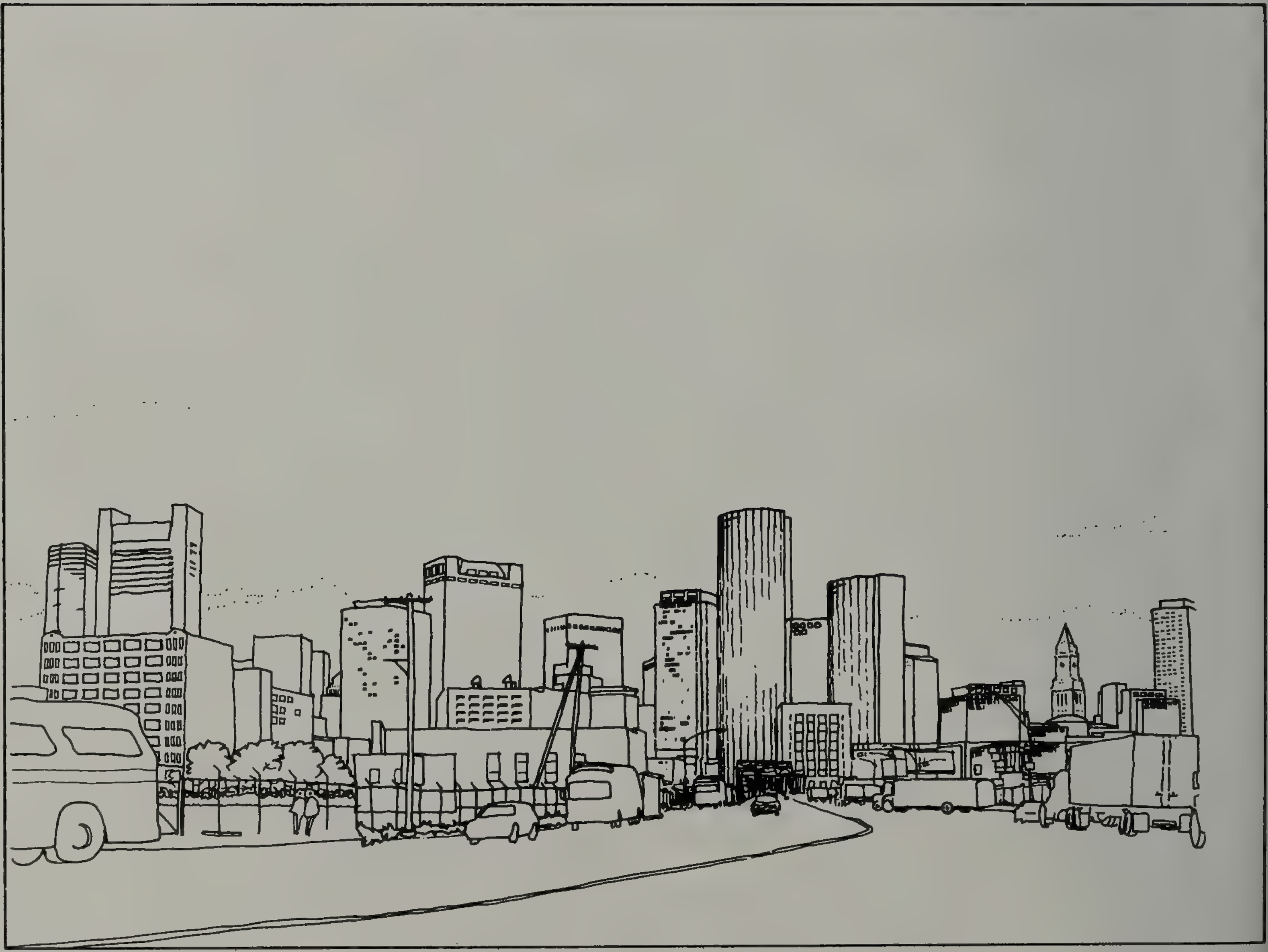
The urban character of Northern Avenue in the Initial Proposal will be maintained with the Lesser-Scale Alternative, as shown in this view. However, variations in massing and orientation lend a greater sense of visual complexity to this urban street edge. Greater emphasis is given to the massing of the buildings that bracket Pittsburgh Street to mark the importance of these buildings as a gateway to the Fan Pier project.

This emphasis is partially achieved by articulating the corners at this street entrance for most of the height of the buildings. The linear emphasis of the extensive street edge is lessened somewhat by the rotated orientation of the third office building on the right, which opens the view slightly towards the lower-scale building that contains the marine resources facilities at Fort Point Channel and the city's downtown beyond. The stepped massing acknowledges not only the lower scale of the nearby commercial and industrial structures, but also provides pedestrian-scaled two-story articulation as well.

VIEW D

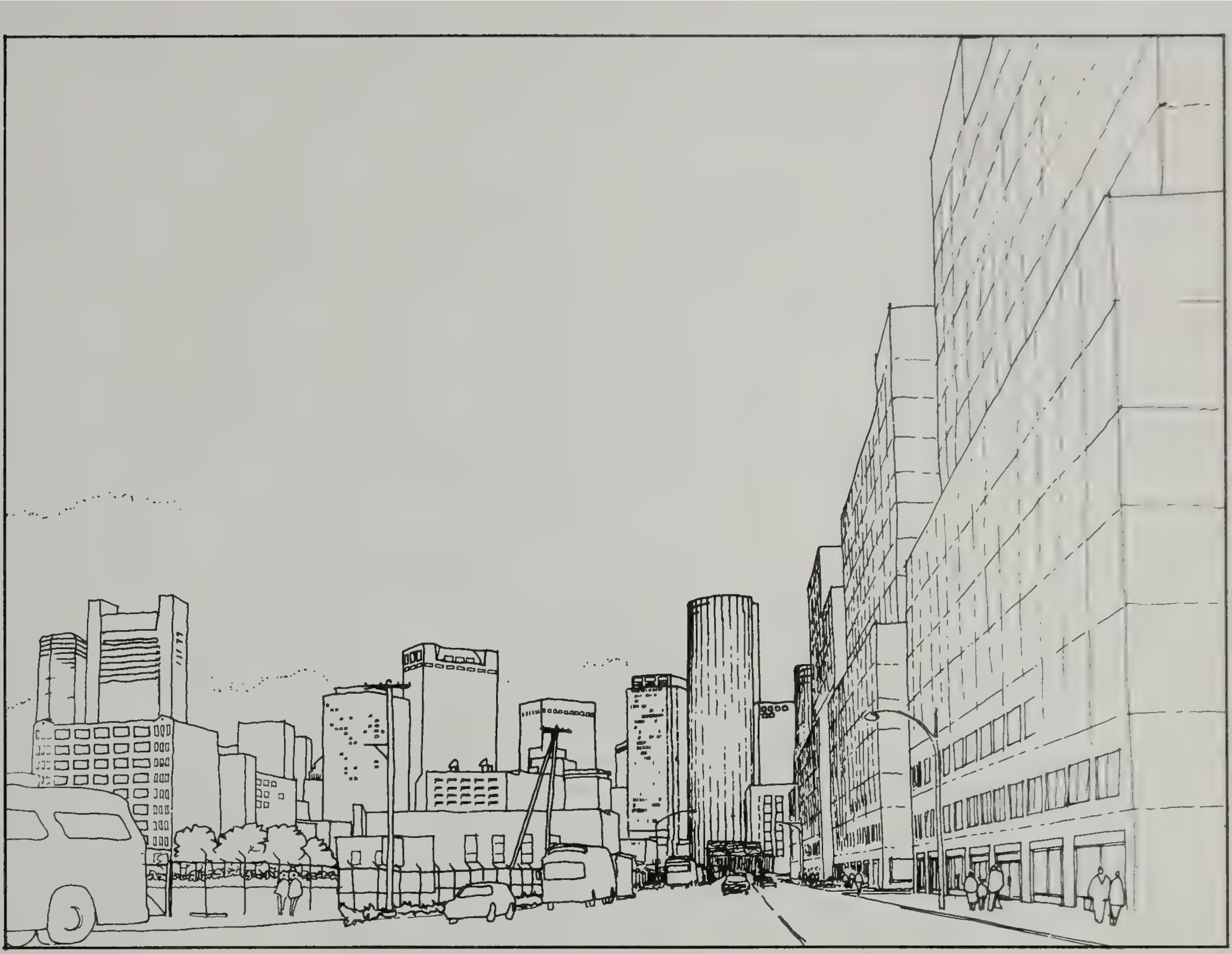


VIEW D
Existing

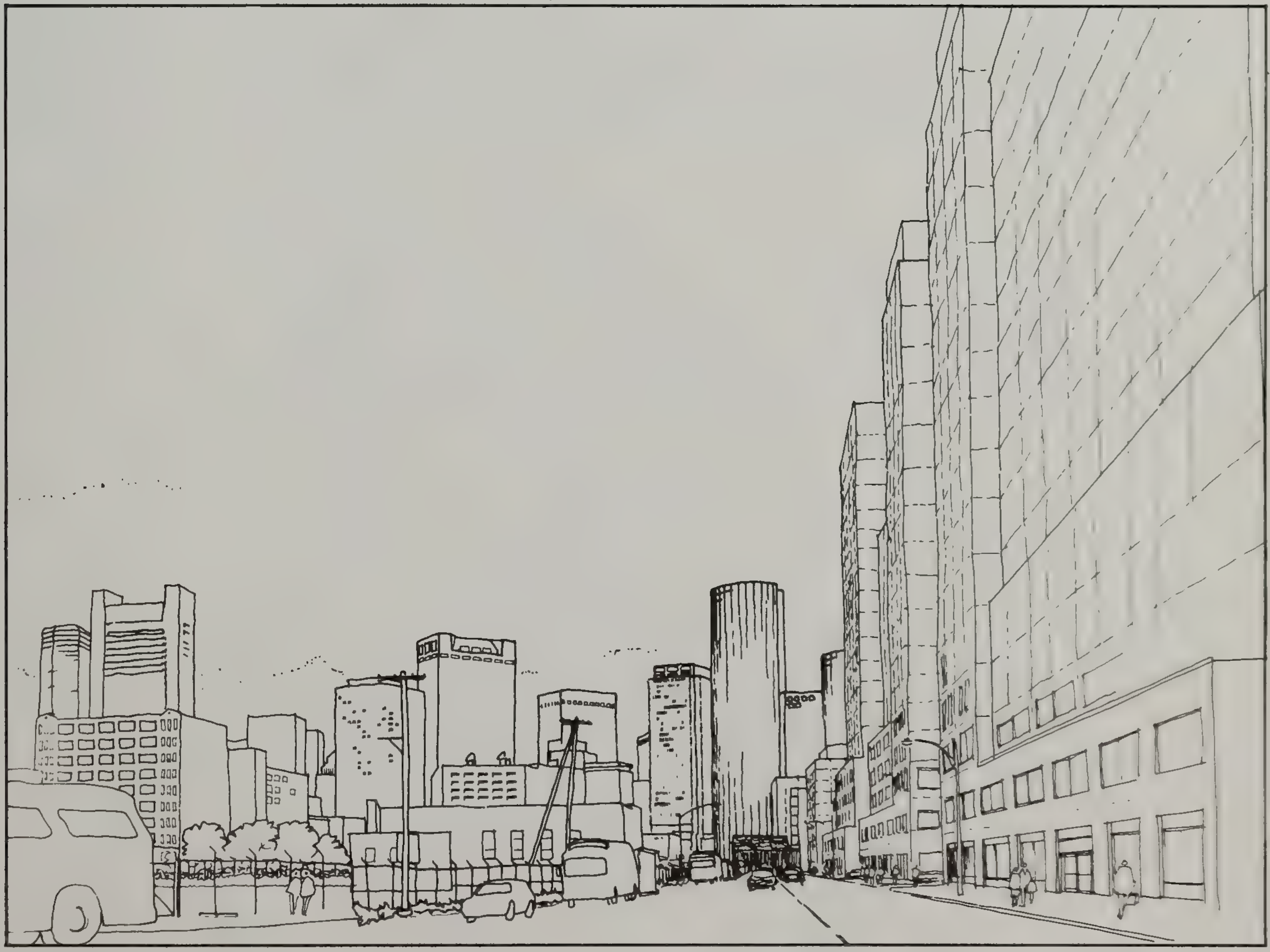


Existing view includes the Rowes Wharf and International Place Developments, currently under construction.

VIEW D
Initial
Proposals



VIEW D
Lesser-Scale
Alternatives



Project views are based on Master Plan data. Architectural facade treatment is provided for scale only.

View E

Fan Pier and
Northern Avenue from
Pittsburgh Street

Existing View

Automobiles parked in the 1500-space lot on Fan Pier and in the restaurant parking area on Pier 4 dominate this weekday, daytime view of the sites from Pittsburgh Street, approximately 350 feet south of Northern Avenue. This view was taken from slightly above a pedestrian vantage point looking northeast towards East Boston, which appears as a low, modulated horizon. Even with a raised viewing angle, the sea of vehicles and the substantial depth of the site serve to block the view of the Inner Harbor beyond.

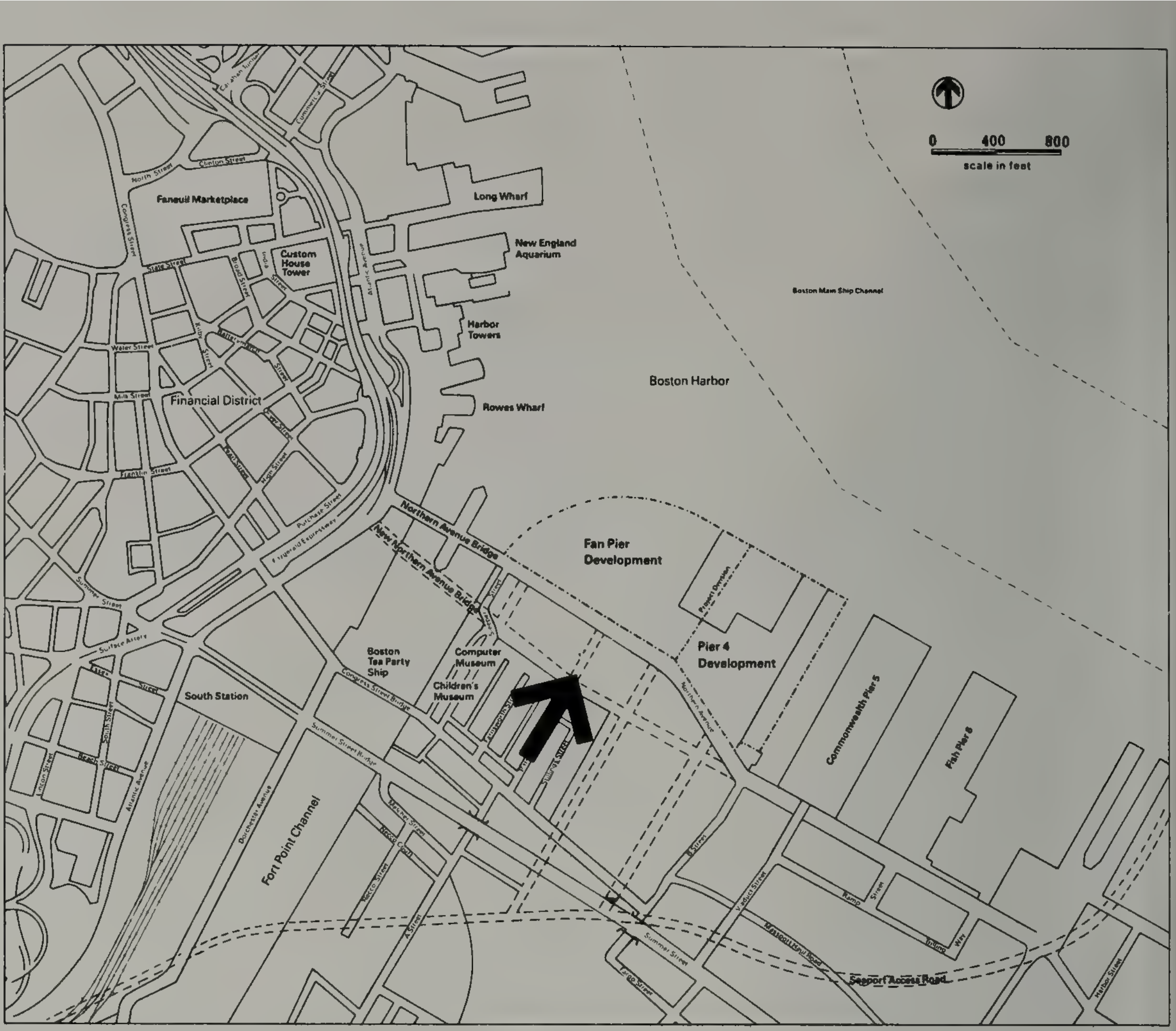
Initial Proposal

With the Initial Proposal, this view is virtually filled by building masses lining the north side of Northern Avenue. Contextual relationships visible from other vantage points can not be readily perceived in this view. However, the rectilinear massing of the buildings and the extension of the street grid pattern into the interior of the site are apparent from locations such as this. The stepped massing of the office buildings on either side of Pittsburgh Street mark the landside entrance to the site, signifying a view corridor that provides glimpses of both structures and open area beyond, suggesting the depth of the project out to the Inner Harbor waterfront. The rise in the street to accommodate the bridge clearance over the new canal also marks the entry to the Fan Pier Development, representing a transition element to the portion of the site north of the canal.

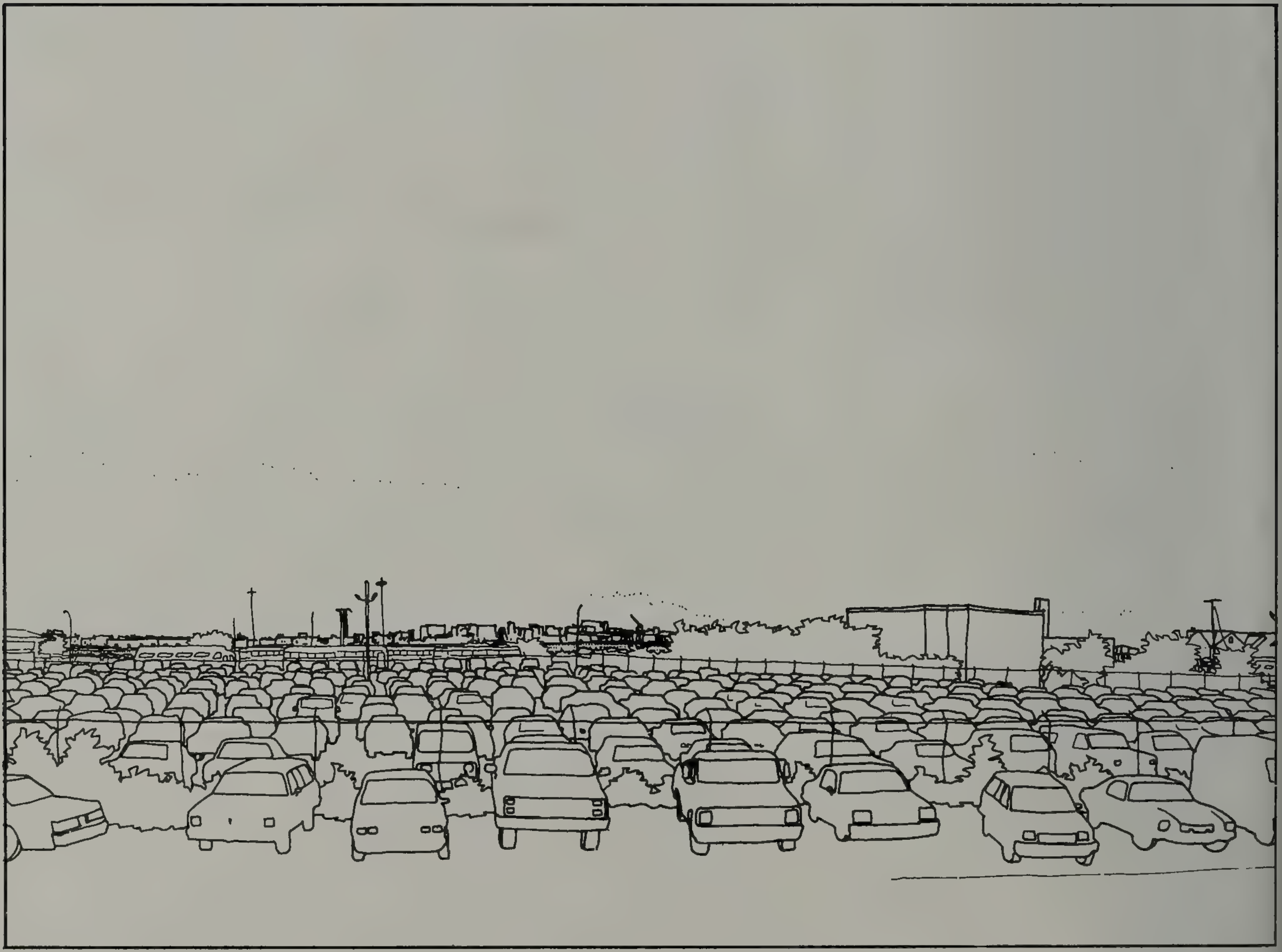
Lesser-Scale Alternative

The Lesser-Scale Alternative incorporates a variety of forms that enliven this view as compared to existing conditions and the Initial Proposal. In the Lesser-Scale Alternative, the office buildings mark Pittsburgh Street more strongly as a gateway to the Fan Pier Development. The top of the Fan Pier hotel tower slips into view above the buildings along Northern Avenue shown in the foreground, while several other towers at divergent angles clearly seen along the Pittsburgh Street view corridor suggest diversity in the spaces beyond. The forms of the tower and base elements are more articulated than in the simple, more regular blocks of the building massing in the Initial Proposal. Perhaps most apparent in comparing the Lesser-Scale Alternative to the Initial Proposal is the introduction of a lower, pedestrian-scale base element for the Northern Avenue buildings, providing a more sympathetic approach from street level.

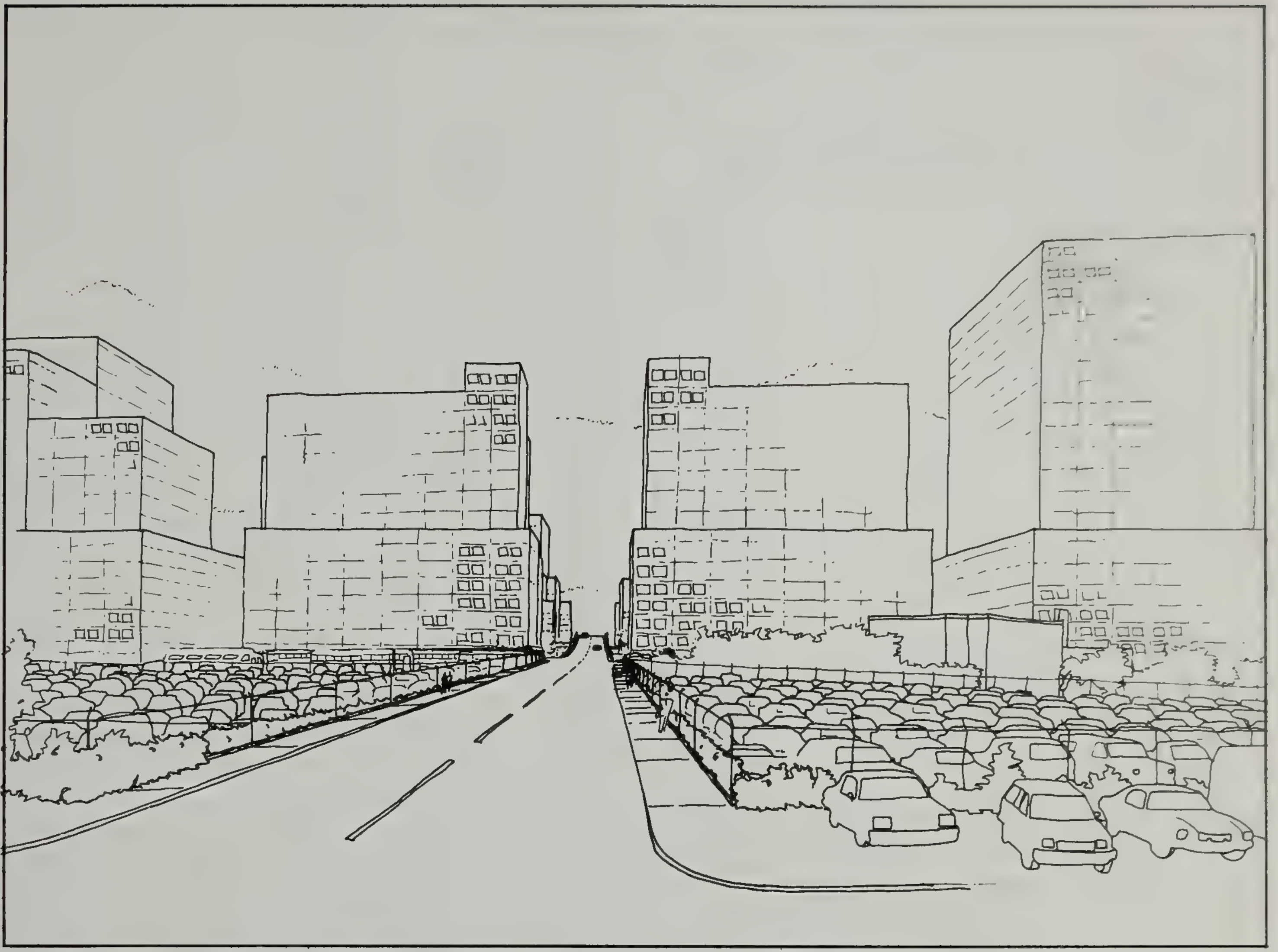
VIEW E



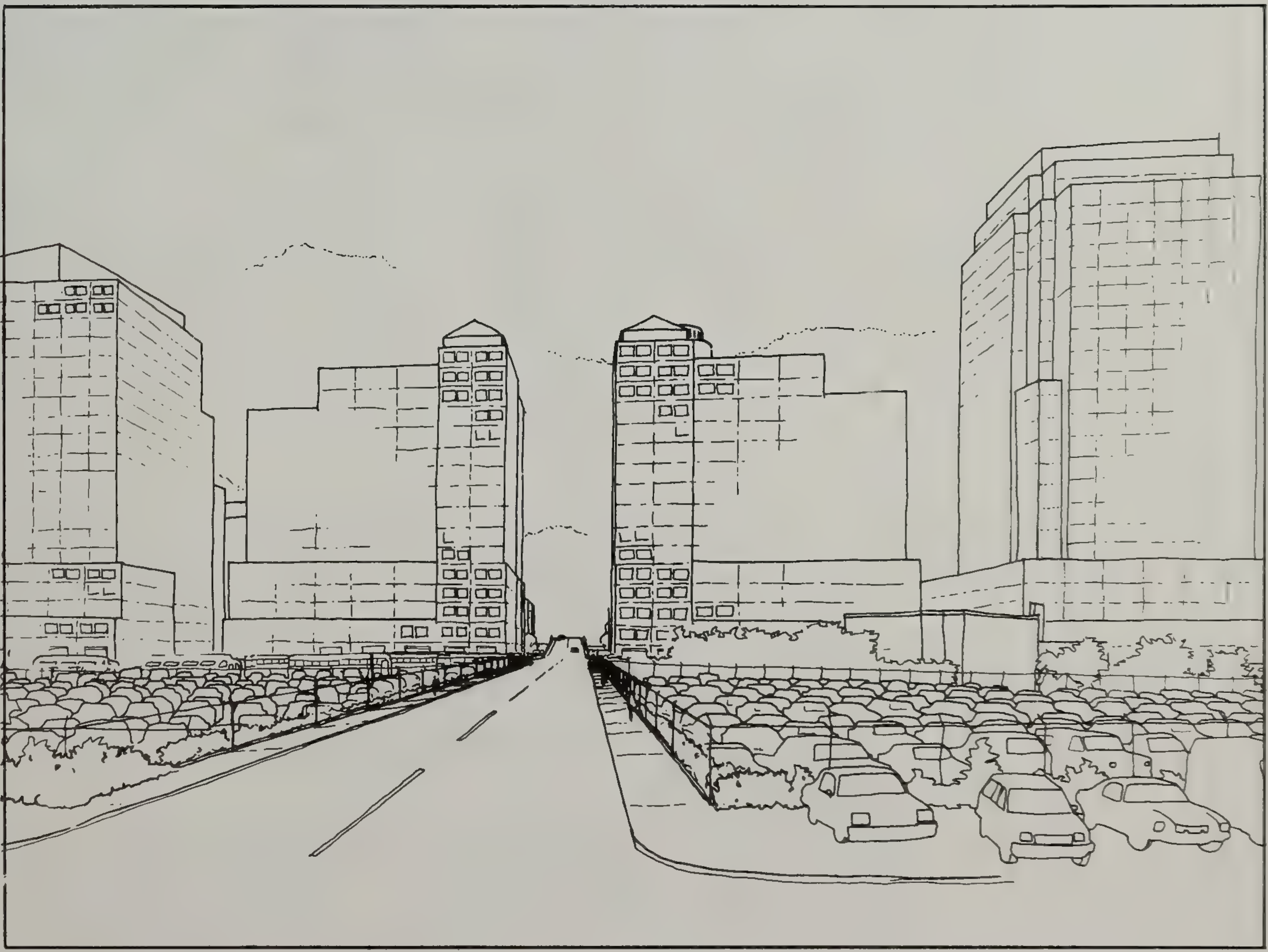
**VIEW E
Existing**



VIEW E
Initial Proposals



VIEW E
Lesser-Scale Alternatives



Project views are based on Master Plan data. Architectural facade treatment is provided for scale only.

View F

Fan Pier and Pier 4
Inner Harbor

Existing View

This view is taken from a commuter ferryboat in Boston's Inner Harbor looking southwest toward the project sites. It suggests the view of Fan Pier and Pier 4 from the East Boston waterfront across the harbor. This view encompasses both project sites, bounded by Commonwealth Pier on the left, and the Financial District to the right. The low edges of the sites are backed by the low industrial and warehouse structures of South Boston. The downtown Financial District appears at the right edge of the view with the high-rise residential complex, Harbor Towers, at the far right, and two mixed-use developments now under construction, International Place and Rowes Wharf, shown as completed.

Initial Proposals

With the Initial Proposals in place, this view shows the complex urban character of the Fan Pier and Pier 4 Developments as an extension of the existing downtown Boston skyline. The skyline edge of this view is formed by the high-rise structures of the proposed developments, with lower-scale base structures along the waterfront edge that respond to the size and orientation of traditional waterfront forms. The uniform breaks in the building masses shown in this view reflect the alignment of the building masses according to the South Boston street grid extended onto the project sites. View corridors directed out to the harbor between the buildings have been established through the use of this organizing element, as shown in this view.

The building masses of the Fan Pier and Pier 4 Developments frame the new marina and protective breakwaters in the basin between the two developments. This view also highlights the landscaped, urban waterfront park extending along the water's edge of Fan Pier. The variation in building massings stepping back from the water's edge is visually less dense than the city's densely-packed Financial District in this view.

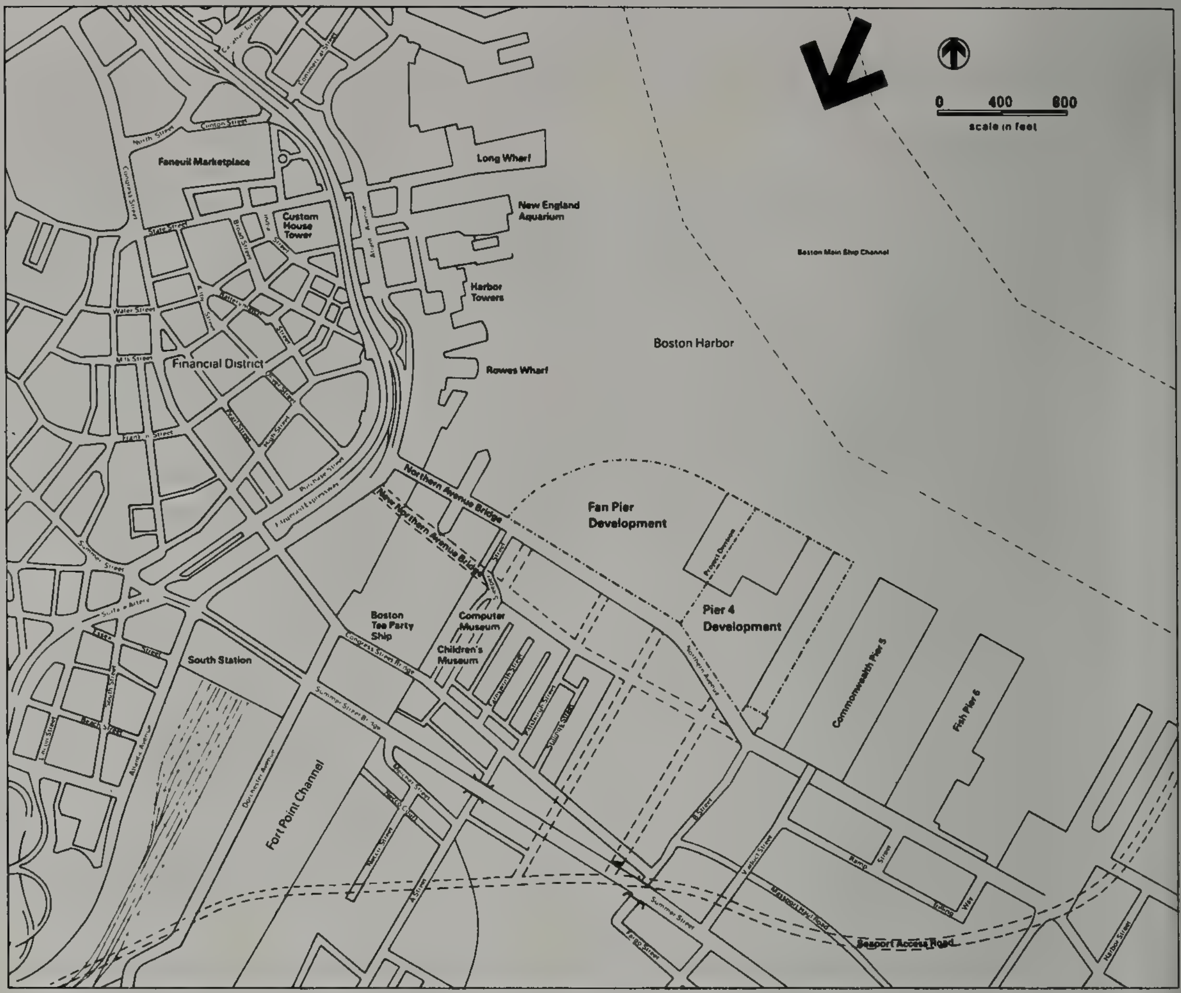
Among the urban forms of the Initial Master Plan Proposals, the Fan Pier hotel tower assumes a special importance due to its height, shape, and location on the site. This tower serves as a beacon or marker for this area of Boston's Inner Harbor waterfront at the mouth of Fort Point Channel.

Lesser-Scale Alternatives

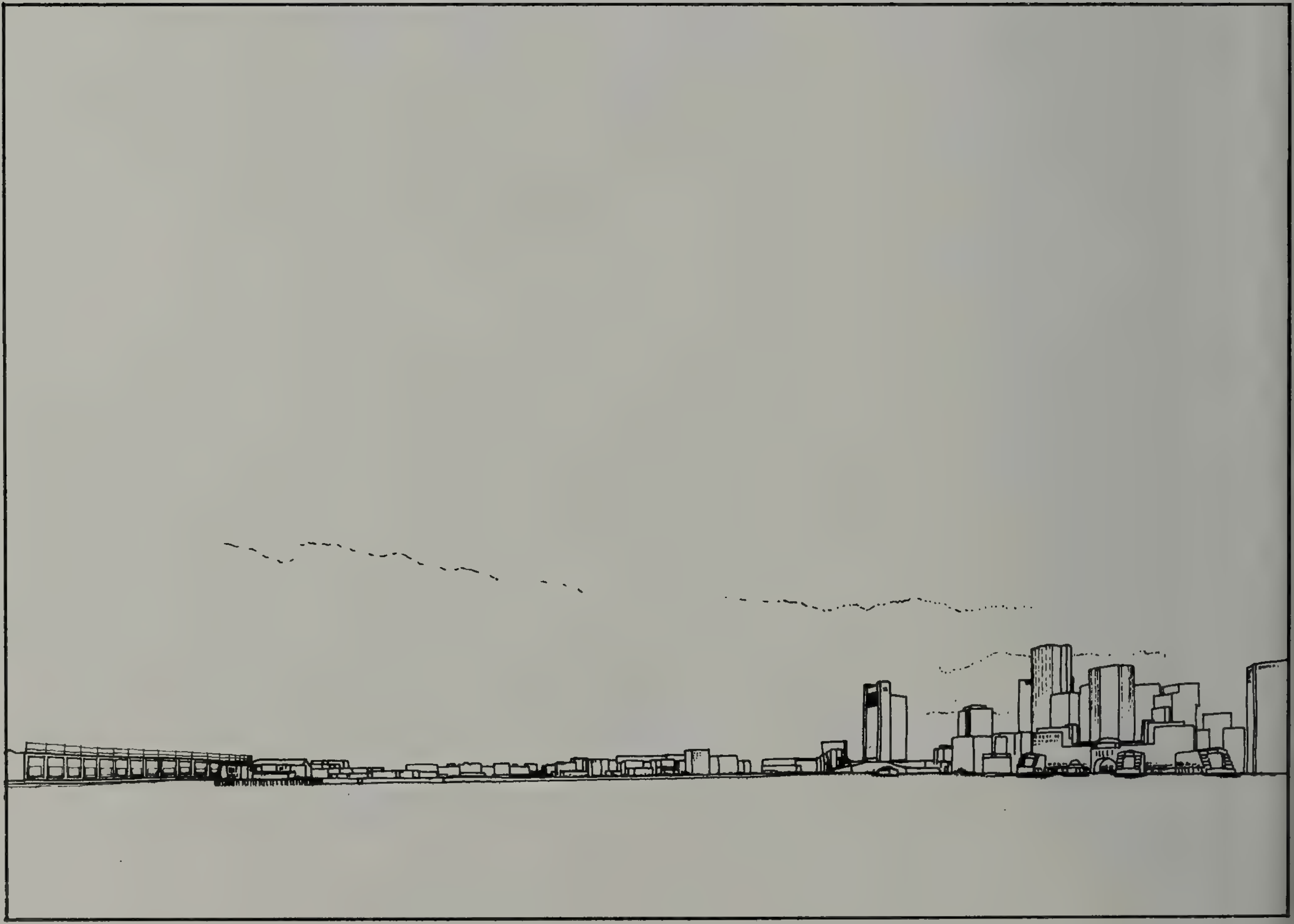
Like the Initial Proposals, the Lesser-Scale Alternatives extends the urban skyline of the downtown along the edge of the Inner Harbor waterfront in this view. However, the average building height has been lowered as compared to the Initial Proposals, resulting in a less massive overall appearance. Backed by taller building elements, the water's edge is expressed by lower-scale building masses, much more pronounced than in the Initial Proposals. The street grid organization and correspond- ing view corridors have been maintained in this view. The Fan Pier waterfront park has been enlarged, and the Pier 4 plaza has been reoriented to open out toward the canal, the marina, and the Inner Harbor beyond. The waterfront park on Fan Pier is highlighted by the radiating pathway and landscaping configuration on the bermed landform. Thus, the Fan Pier waterfront park, the Pier 4 open spaces along the marina, and the marina basin itself create a lower-scale, pedestrian-oriented environment along the water's edge extending from the mouth of Fort Point Channel to Anthony's Pier 4 Restaurant, as depicted in this view. The organization of building masses and open space in both developments better responds to site-specific constraints, resulting in a much more varied visual ensemble.

In this alternative, the Fan Pier hotel tower is taller, with more slender proportions than the corresponding tower in the Initial Proposal, further emphasizing its role as a harbor marker and beacon. At the junction of the Fan Pier canal, the marina basin, and the Pier 4 open plaza, the Pier 4 hotel/residential tower serves as a focal point for the marina and as a counterpoint to the Fan Pier hotel.

VIEW F

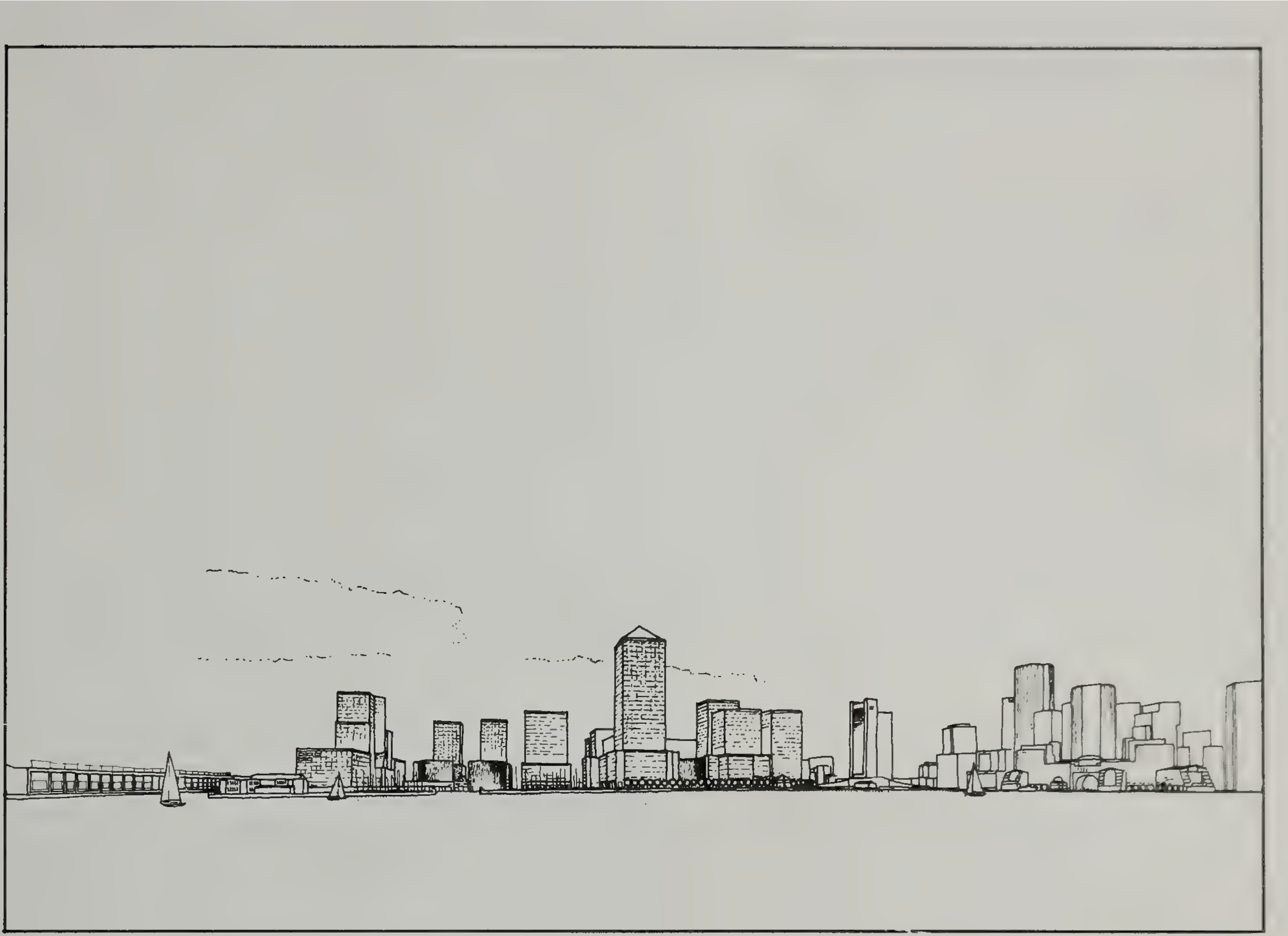


VIEW F
Existing

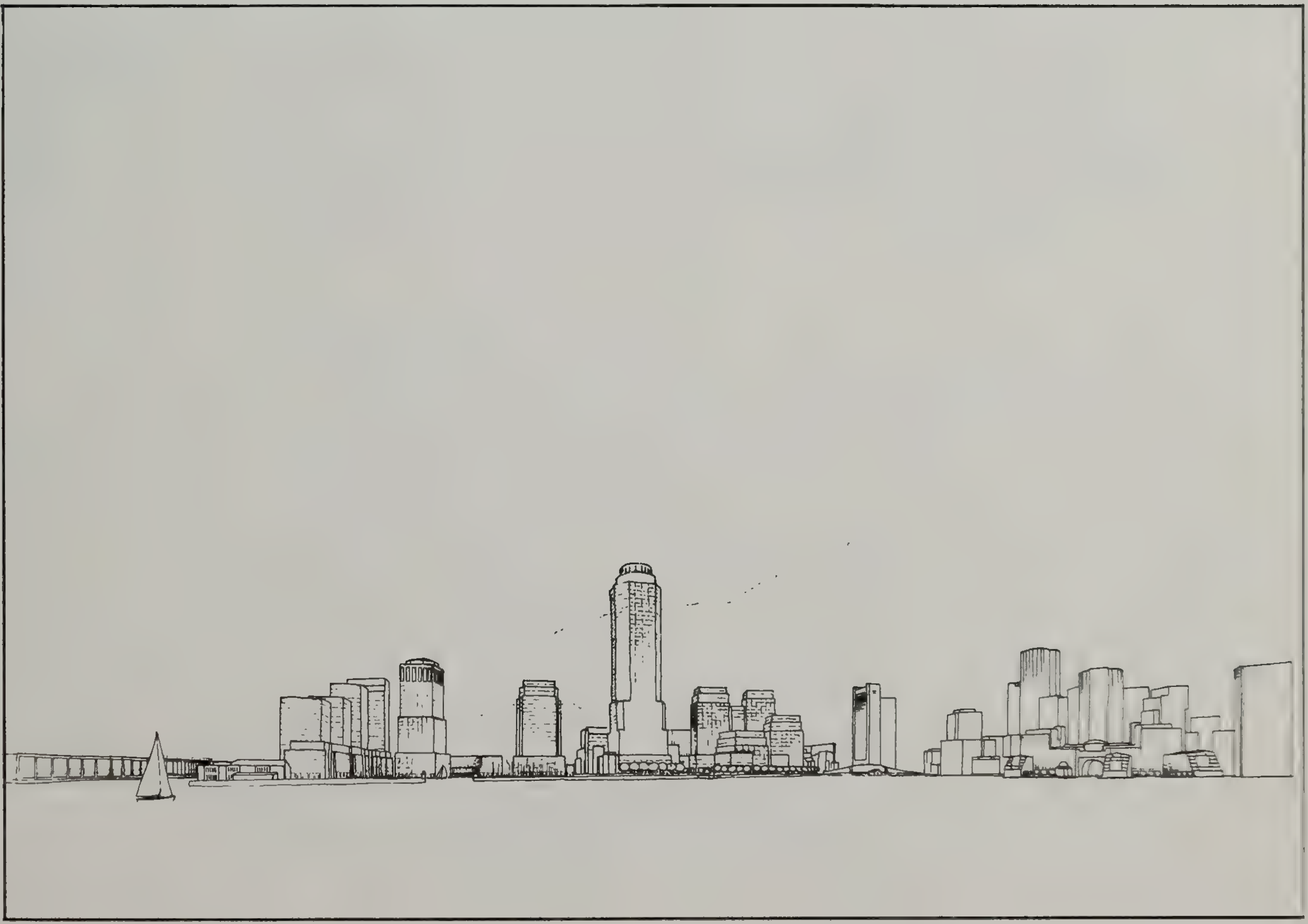


Existing view includes the Rowes Wharf and International Place Developments, currently under construction.

VIEW F
Initial
Proposals



VIEW F
Lesser-Scale
Alternatives



Project views are based on Master Plan data. Architectural facade treatment is provided for scale only.

View G

Pier 4 and Fan Pier from the Commonwealth Pier Apron

Existing View

This view is from the end of Commonwealth Pier 5 on the pier apron. The apron, which is under the control of the Massachusetts Port Authority, will be publicly accessible when the present renovation of Pier 5 and the World Trade Center is completed. Across the slip to the west of Pier 5 is Anthony's Pier 4 Restaurant. Rising behind the restaurant are the forms of some of Boston's taller downtown structures, from the Federal Reserve Bank on the extreme left to Harbor Towers on the extreme right. The heart of the Financial District is in the middle of the view, including the Bank of Boston, State Street Bank, Exchange Place, and Sixty State Street. Rowes Wharf and International Place, now under construction, are shown as completed projects.

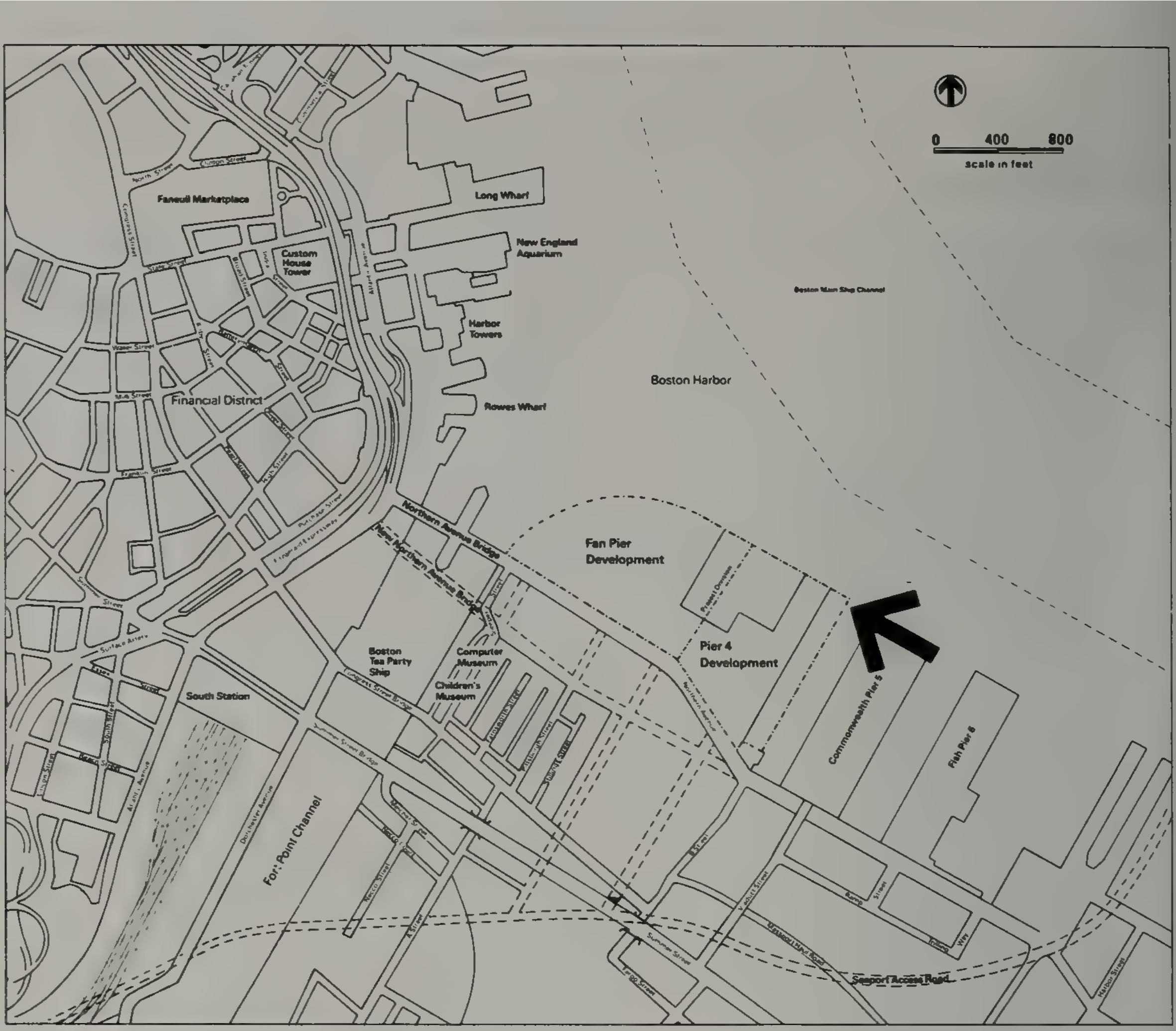
Initial Proposals

As viewed from the apron of Commonwealth Pier 5, only a small portion of the Initial Proposal for the Pier 4 Development is visible to the left of Anthony's Pier 4 Restaurant. Most of the project mass is hidden from view by the Commonwealth Pier 5 building. The Fan Pier Development buildings blend into the urban skyline with the exception of the Fan Pier hotel, which serves as the landmark tower for this new waterfront development. The Initial Proposals for the Fan Pier and Pier 4 Developments extend the city's downtown waterfront to the South Boston waterfront at the mouth of Fort Point Channel, affecting the view of the downtown Financial District from the publicly accessible apron of Commonwealth Pier 5.

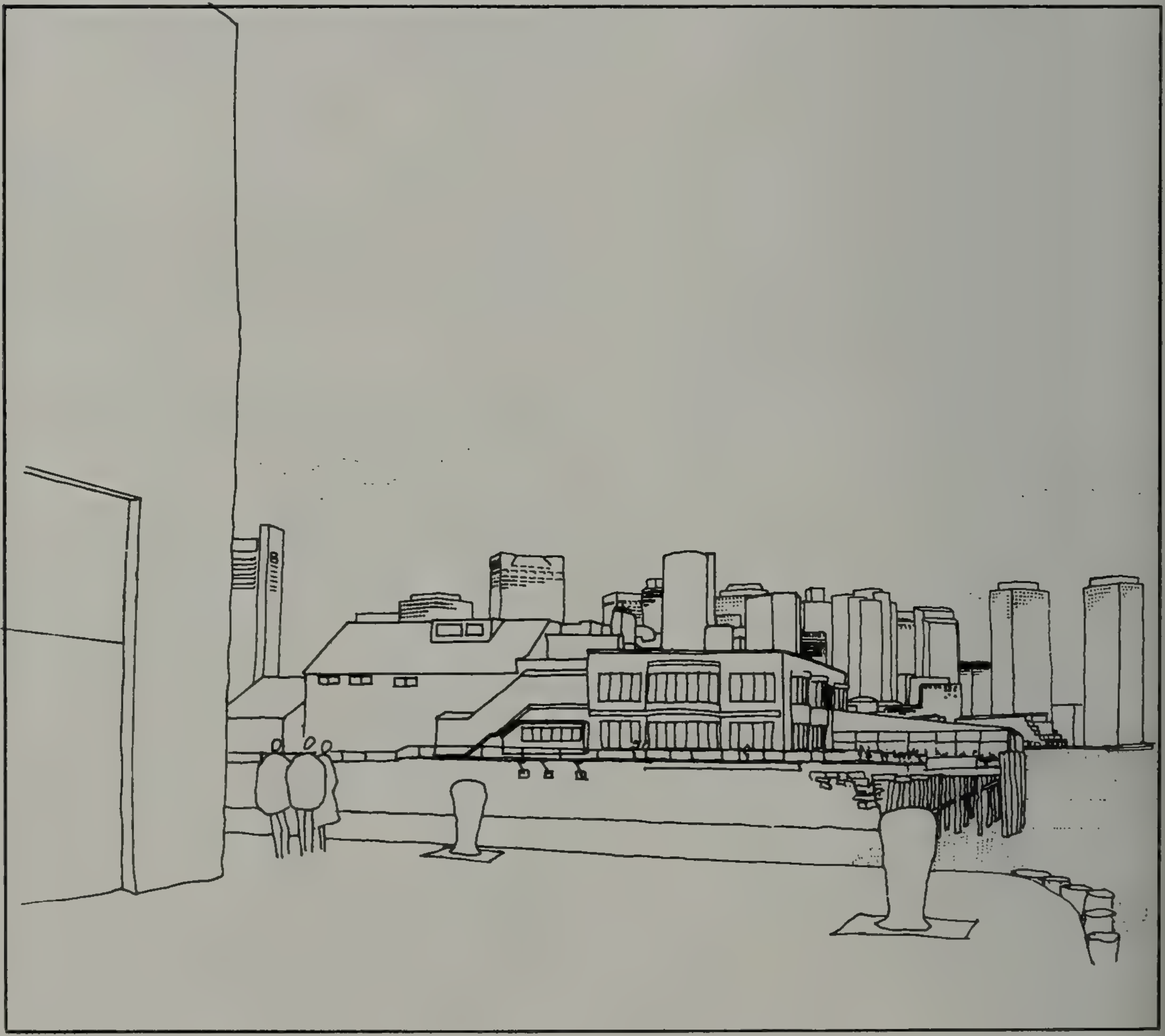
Lesser-Scale Alternatives

The reduced scale of the Fan Pier buildings closest to the water's edge permit a more complete view of the Financial District. In contrast, the Fan Pier hotel tower is noticeably taller and has more slender proportions than the buildings surrounding it, clearly establishing it as a landmark element. The Pier 4 hotel tower complements the Fan Pier tower and creates an internal reference point for the sites. In addition to the reduced massing along the Harborfront edge, the tree plantings and arcades along Pier 4 also reinforce the pedestrian scale of the water's edge. Finally the stepped building massing provides a transition between the Pier 4 hotel tower, Anthony's Pier 4 Restaurant, and the wide expanse of Boston's Inner Harbor.

VIEW G

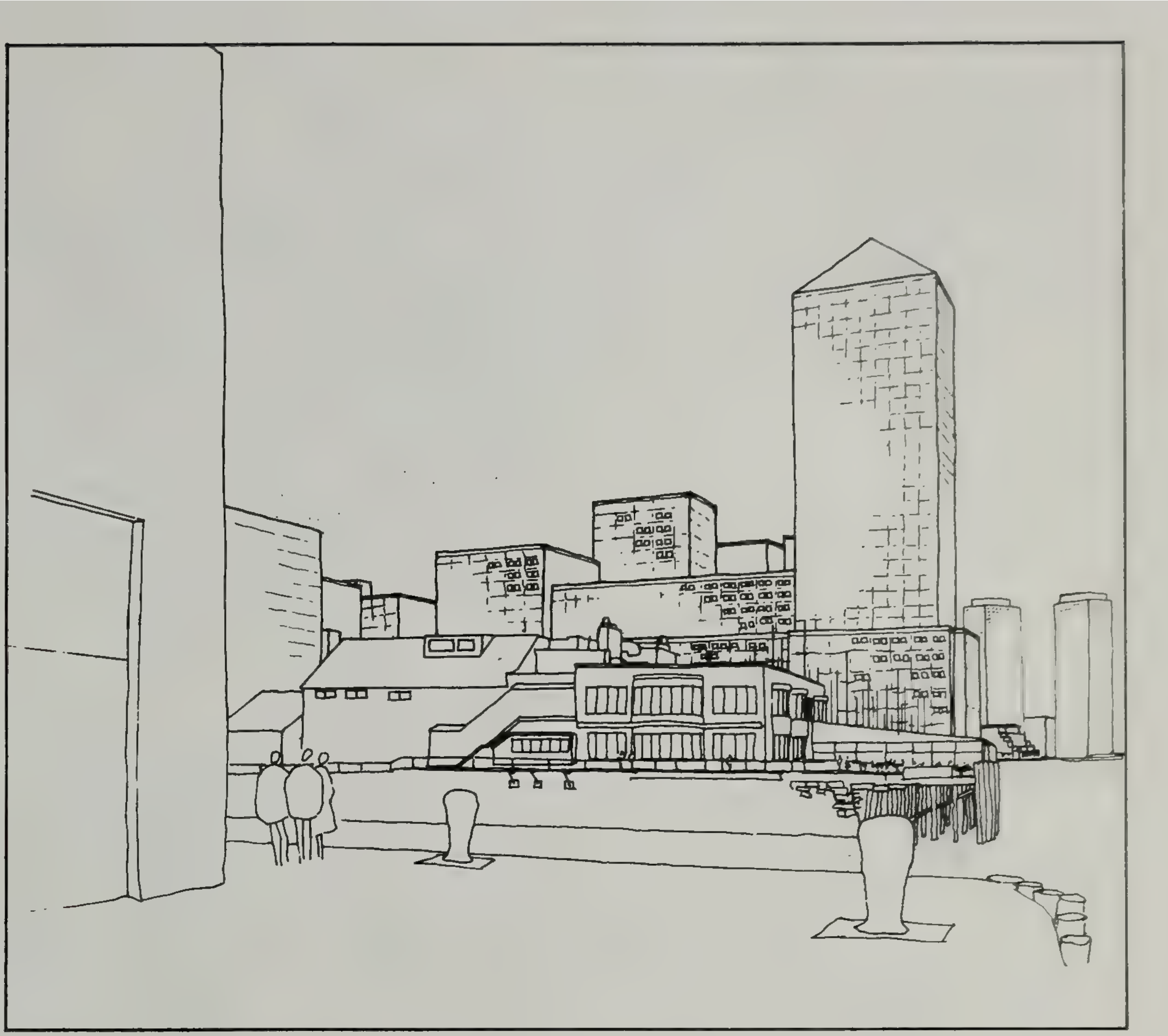


VIEW G
Existing

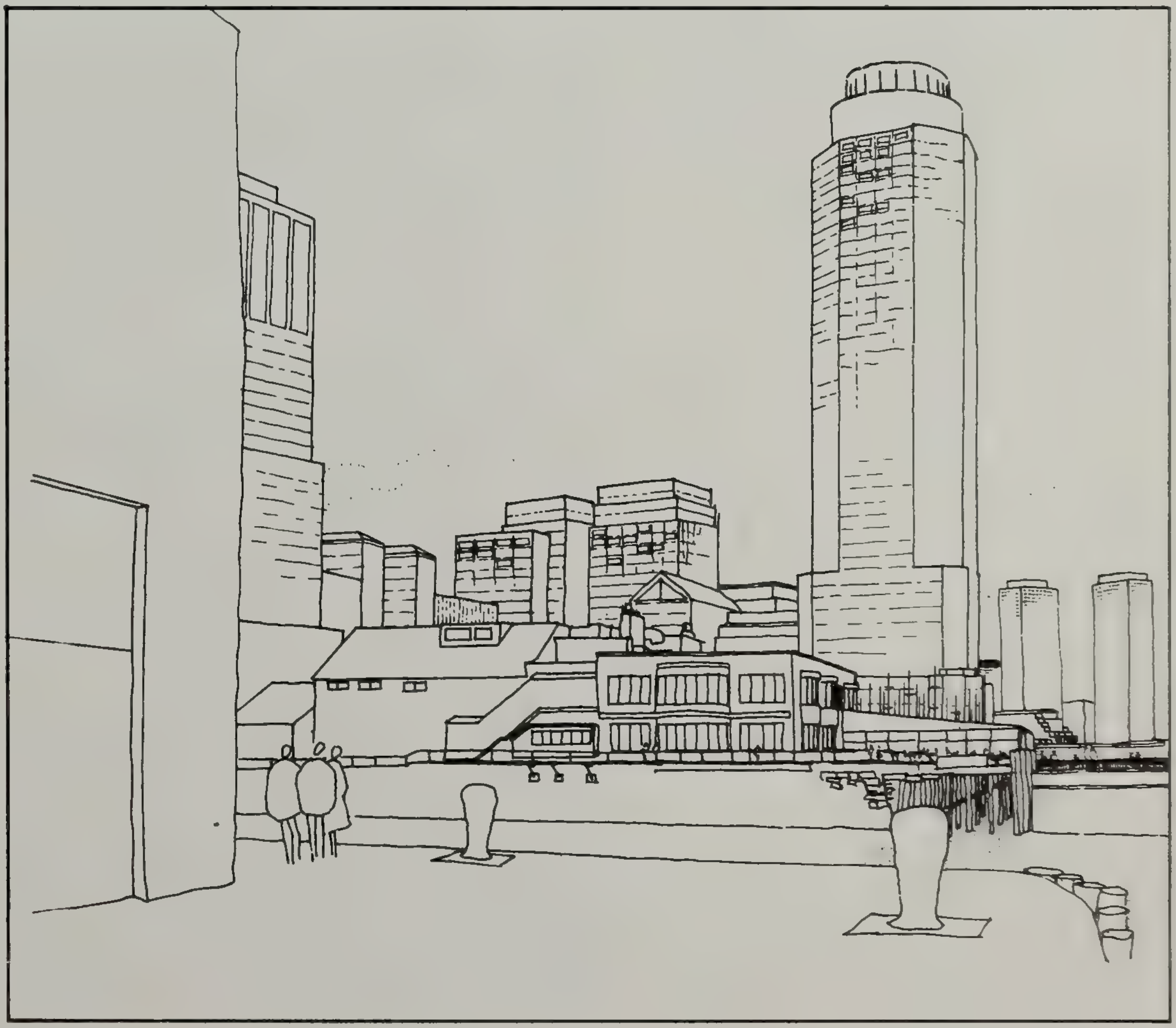


Existing view includes the Rowes Wharf and International Place Developments, currently under construction.

VIEW G
Initial Proposals



VIEW G
Lesser-Scale Alternatives



Project views are based on Master Plan data. Architectural facade treatment is provided for scale only.

View H

Pier 4 Plaza
from the Fan Pier

Existing View

From a viewpoint on the eastern edge of the Fan Pier/Pier 4 property division between the head of the inlet and Northern Avenue, facing east, the viewer is confronted with an expanse of unused paved surface in a state of disrepair, fenced off from access, with scattered sheds, dumpsters, and light standards. Commonwealth Pier stretches across the entire background of the view. In the middle are the parking areas used to service Anthony's Pier 4 Restaurant. At the left of the view, a small portion of the slip which separates the Fan Pier from Pier 4 can be discerned.

Initial Proposal

This vantage point provides a view into the public plaza set into the interior of the Pier 4 Development. Low, curved structures frame the public common. The view into this space extends further back into a large arcade carved through the main block of the hotel building mass. This axial cut is marked by a large space frame and the massing and organization of the tower itself. As seen from this point along the Fan Pier canal across the water, the public common open space will be frequented by a variety of boats and waterborne visitors.

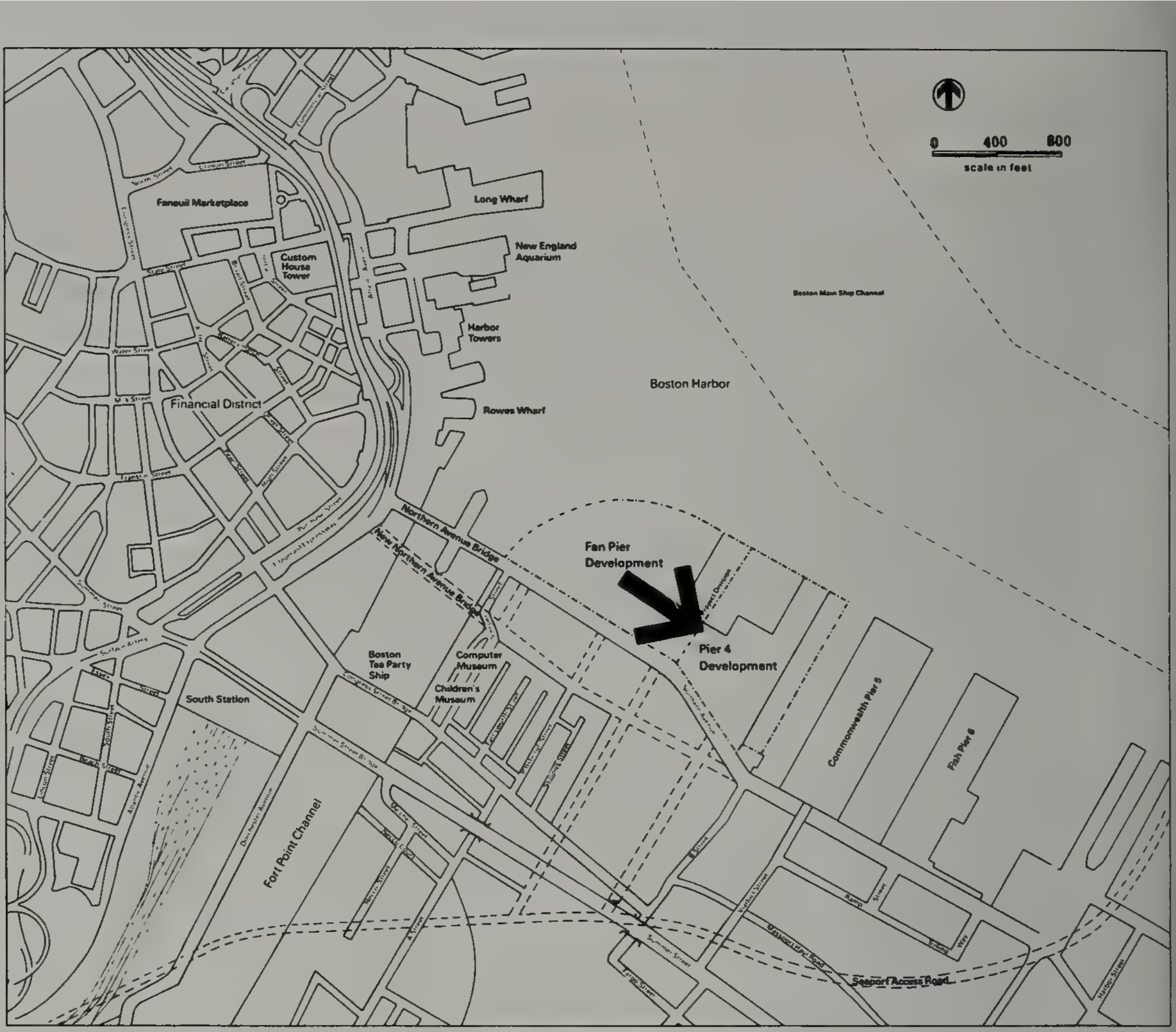
The rounded shape of the buildings on the left allows a narrow range of views overlooking the Fan Pier Development, the downtown, and the Inner Harbor, as well as of the canal and marina basin in the immediate foreground.

Lesser-Scale Alternative

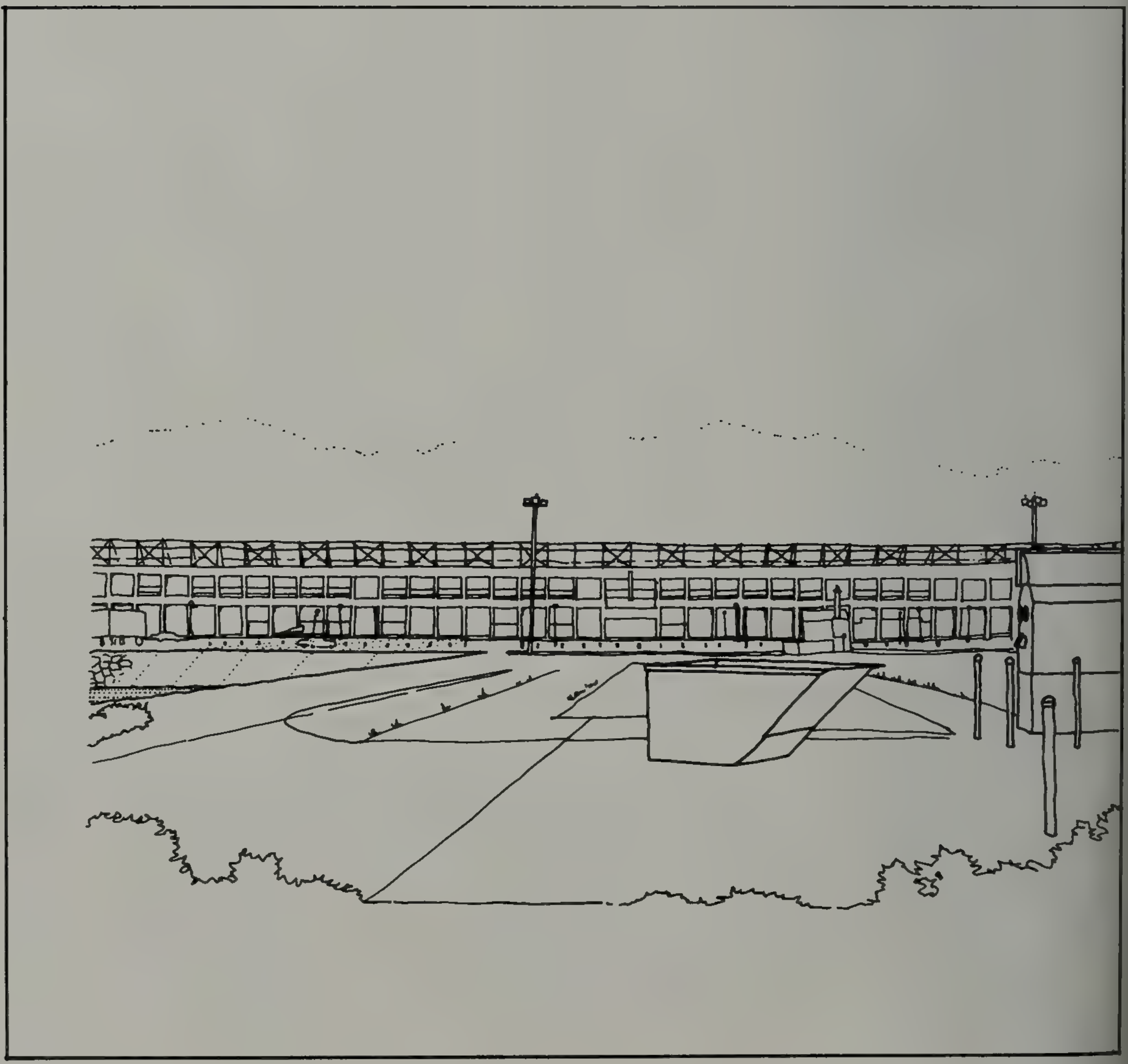
As with the Initial Proposal, this view of the Pier 4 Development Lesser-Scale Alternative focuses on a major public plaza. This space has been reconfigured to open out to the water--the new canal, the marina basin, and the Inner Harbor. A consistent, continuous base building encloses the south and east sides of the plaza. This base structure--articulated by a pedestrian arcade appropriate to the two stories of retail uses located in the ground floors--is visually and functionally linked to the adjacent Fan Pier building. Active retail uses and programmed events will enliven the plaza. In the left side of this view, the landmark tower of the Pier 4 hotel rises from the base structure, serving as a counterpoint to the open space plaza. The tower is rotated slightly, to align with the existing seawall and subtly encouraging views and pedestrian movement out from the plaza towards the open, waterfront edges of the site.

The residential towers along the eastern edge of Pier 4 can be seen in the background as they sequentially increase in height away from the water's edge. The impact of these towers from this point of view is reduced by the pedestrian-oriented character and scale of the public plaza, which provides a strong visual intermediacy of pedestrian-scale activity.

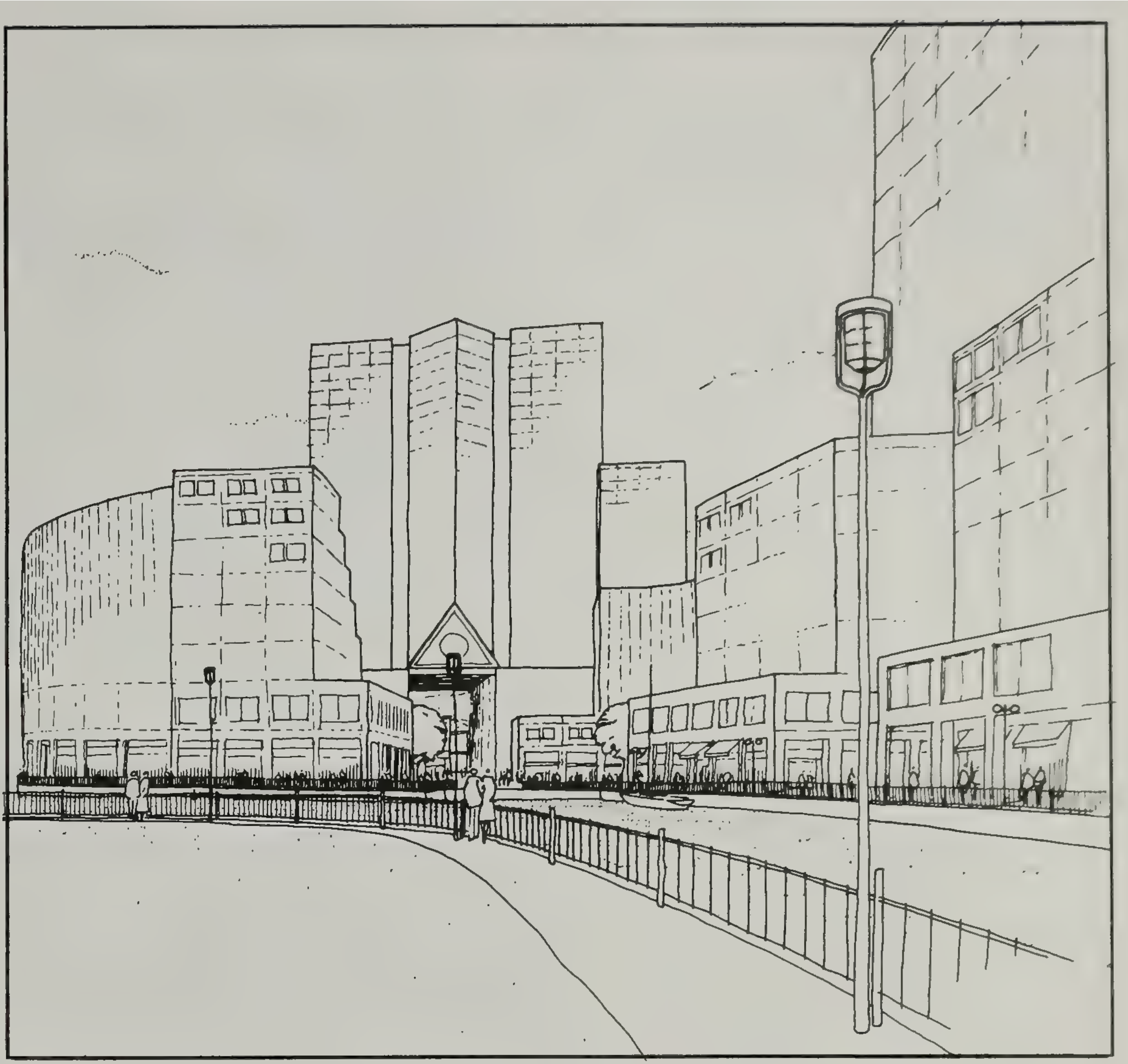
VIEW H



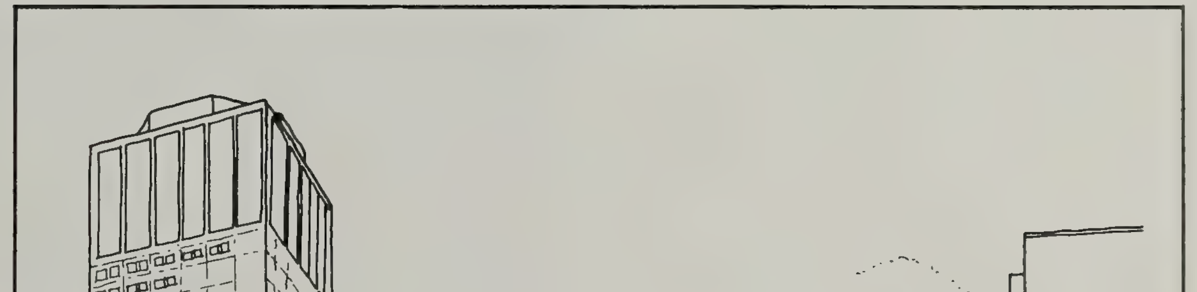
VIEW H
Existing



VIEW H
Initial
Proposals



VIEW H
Lesser-Scale
Alternatives



Project views are based on Master Plan data. Architectural facade treatment is provided for scale only.

View I

Viaduct Street

Existing View

Taken from the viaduct leading to the Commonwealth Pier Headhouse, this view extends down Northern Avenue toward the Northern Avenue Bridge at Fort Point Channel. The industrial buildings on the left side of Northern Avenue, and the historic Headhouse to the right, are representative of South Boston's Inner Harbor waterfront context. Fan Pier and Pier 4 can be seen extending beyond Commonwealth Pier and the buildings along Northern Avenue in the foreground out toward Fort Point Channel and the high-rise buildings of downtown. Except for a glimpse of water on the Commonwealth Pier 5 side of Pier 4, no water appears in this view.

Initial Proposals

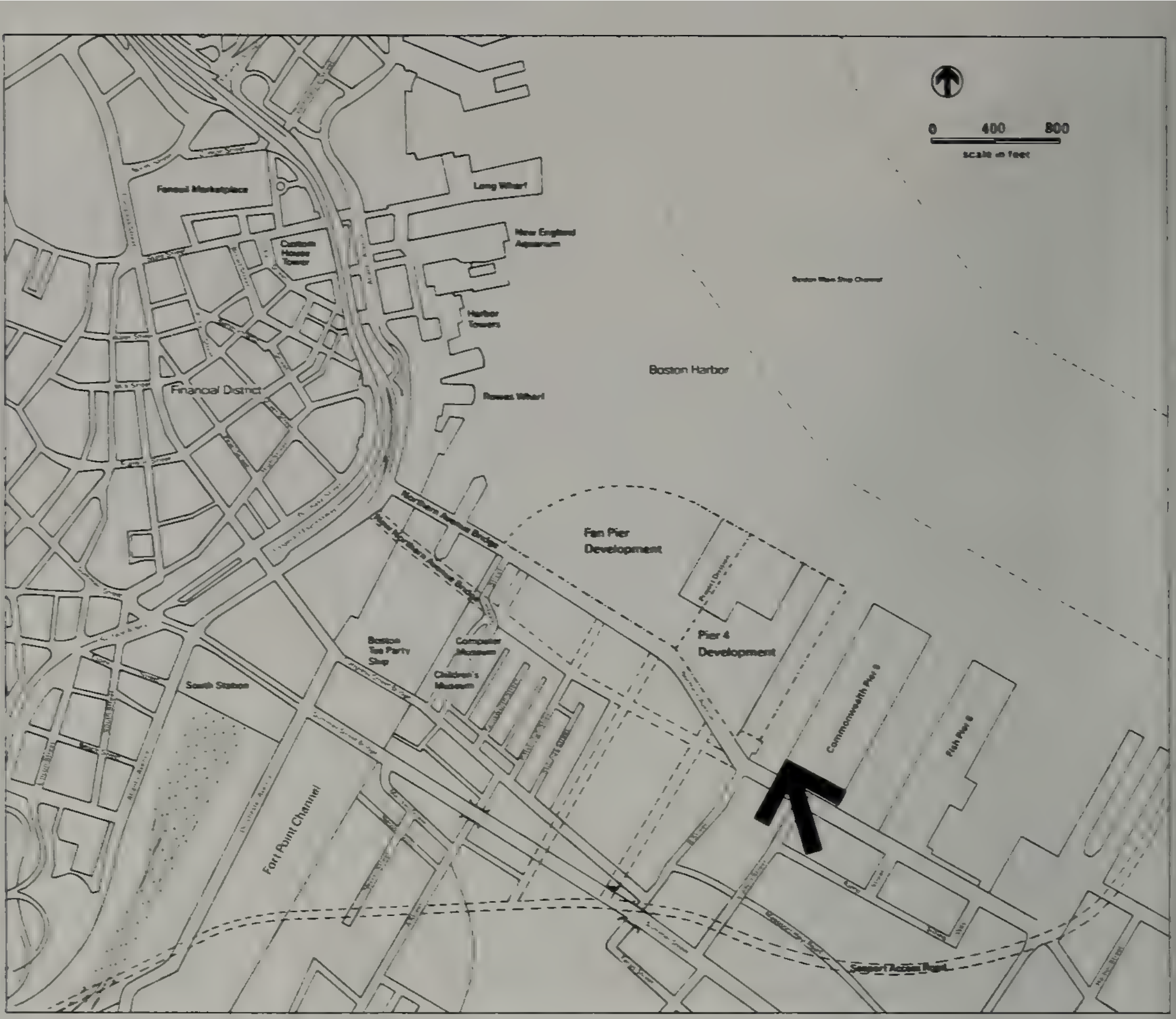
This view clearly demonstrates the relationship between the Fan Pier and Pier 4 Developments and the downtown, and the neighboring commercial and industrial structures. The low tower bases, ranging in height from six to nine stories, relate well to the Fort Point Channel and Commonwealth Flats structures to the left, and the lower-scale buildings that characterize the downtown Financial District beyond. The higher tower elements of the Fan Pier and Pier 4 Developments characterize the identity of these developments as an extension of the downtown urban fabric. The symmetrical elongated massing configuration of the Pier 4 Development along the length of Pier 4 serves to terminate this development pattern. The symmetry of the Pier 4 hotel building is somewhat similar to the Beaux Arts symmetry of the historic Commonwealth Pier, but with a different orientation to Northern Avenue. The southern edge of the Pier 4 hotel building forms an oblique angle with Northern Avenue.

Lesser-Scale Alternatives

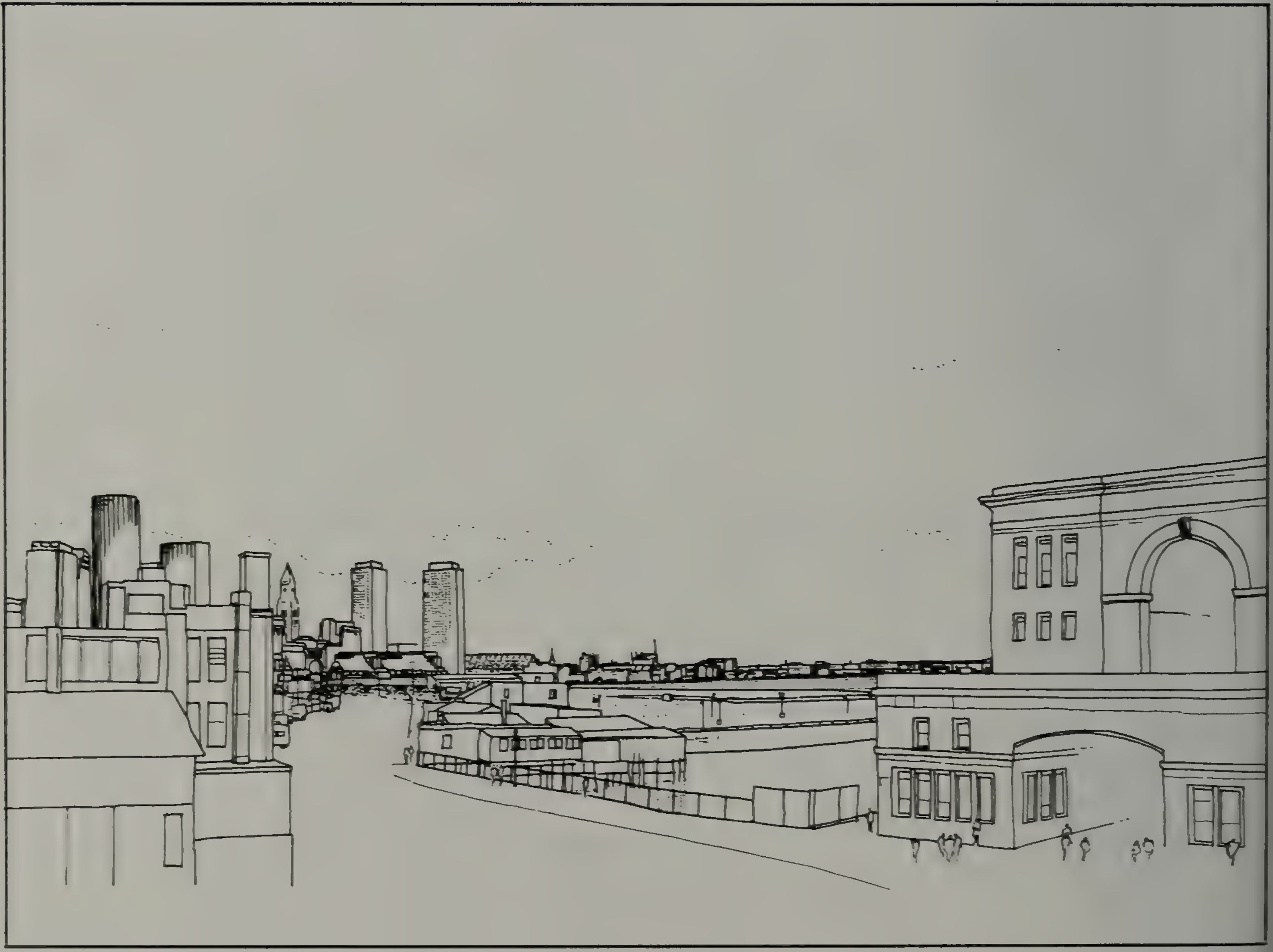
The row of towers atop the seven-story base structure lining the eastern edge of Pier 4 forms the predominate impression of the Lesser-Scale Alternative in this view. The towers represent a virtual extension of the downtown urban scale. The stepped bases of the towers facing Commonwealth Pier 5 relate to the lower-scale industrial buildings along the South Boston waterfront, particularly to the stepped massing of the historic Commonwealth Pier 5 Headhouse shown in the foreground. The two tower-like masses framing Pittsburgh Street can be seen in this view as lending a formal order to the Northern Avenue elevations of the developments. The south faces of both of these buildings follow the edge of Northern Avenue.

As demonstrated in other views of the Fan Pier and Pier 4 Developments, the increased variety in tower shapes, sizes, and orientation adds visual diversity to the Lesser-Scale Alternatives.

VIEW I

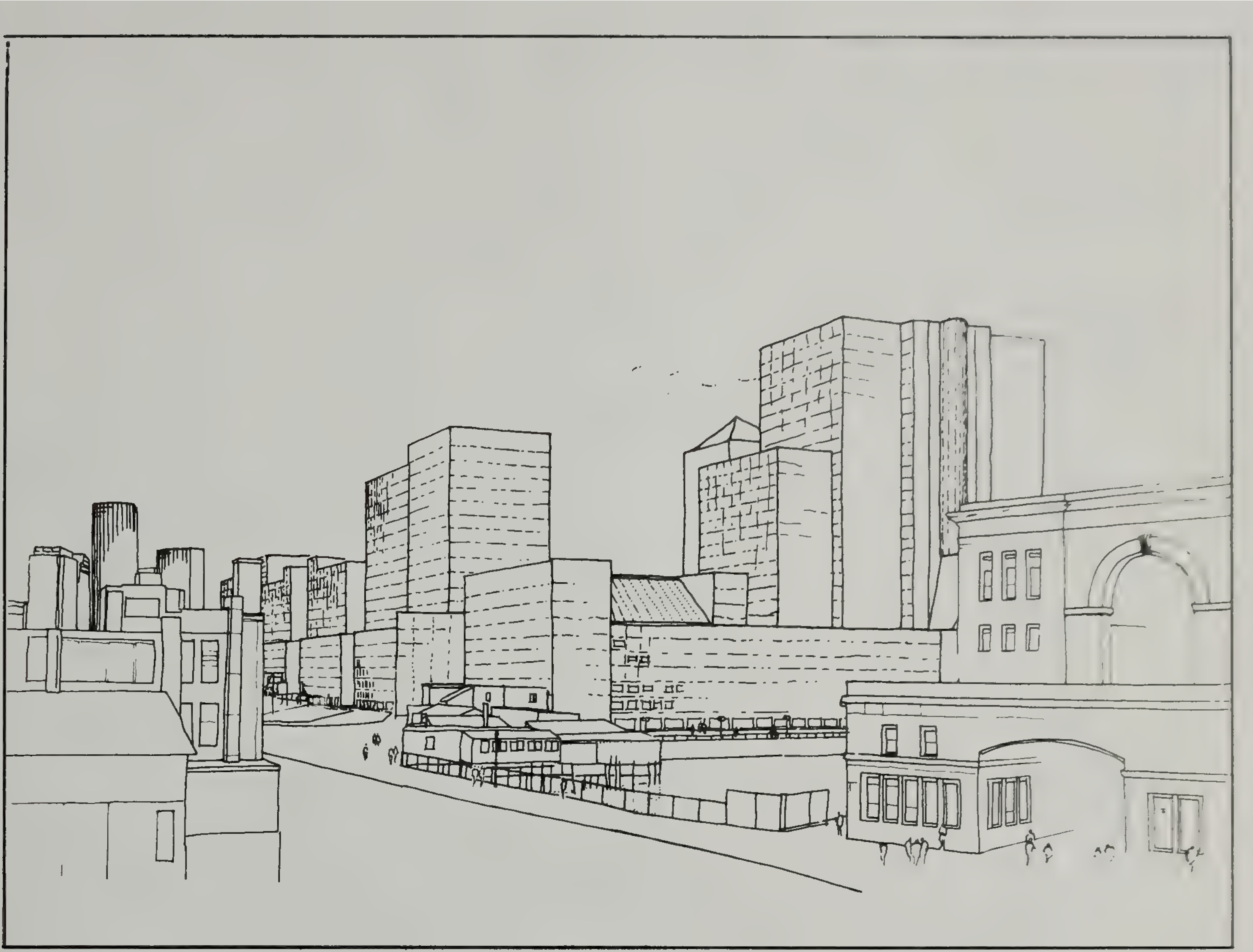


VIEW I Existing

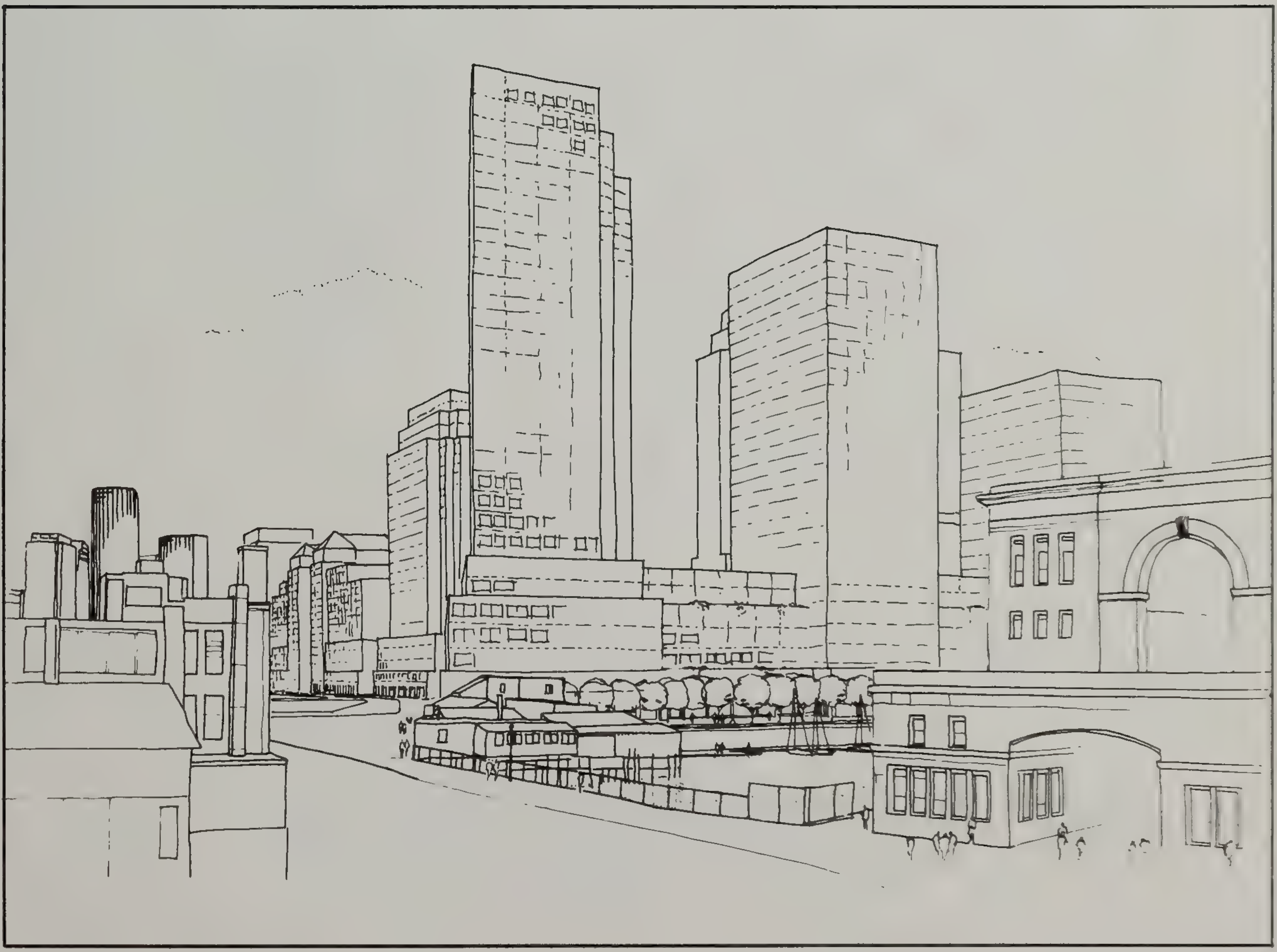


Existing view includes the Rowes Wharf and International Place Developments, currently under construction.

VIEW I
Initial Proposals



VIEW I
Lesser-Scale Alternatives



Project views are based on Master Plan data. Architectural facade treatment is provided for scale only.

V.2

Urban Design Issues
Shadow

INTRODUCTION

A series of computer-generated shadow studies have been used to predict and evaluate the extent of new project-generated shadows associated with the development of the Fan Pier and Pier 4 Master Plan alternatives. The study area includes the portion of South Boston bounded by Fort Point Channel, Summer Street, Boston Fish Pier 6, and Boston Harbor.

This shadow analysis evaluates the Initial Proposal and Lesser-Scale Alternative for each project as described in Chapter III. Project shadows are of particular interest for the following locations: (1) Fort Point Channel; (2) Northern Avenue; (3) Commonwealth Pier 5; (4) Fan Pier canal and walkways; (5) Fan Pier open space and park; (6) Pier 4 open space and plaza; and (7) Fan Pier and Pier 4 marina. Project shadow effects on each of the seven areas are described for 9:00 a.m., Noon, and 3:00 p.m. for the following times of year:

- March 21, spring equinox--the condition that shows the average shadow to be expected during the majority of the year. Shadow conditions on this day are roughly equivalent to those on September 21, the fall equinox.

- June 21, summer solstice--the condition that identifies the shortest shadows of the year, when the sun is at its lowest. Daylight savings time was used for this analysis.

- December 21, winter solstice--the condition that indicates the longest shadows of the year, when the sun is at its highest.

In the accompanying computer drawings, the shadows cast by existing buildings in the area are shown in one tone, while those cast by the proposed developments are shown in a contrasting tone.

SUMMARY OF FINDINGS

- Initial Master Plan Proposal

Shadow conditions for the Fan Pier and Pier 4 Initial Proposals are shown in Figures V.2-1, V.2-2, and V.2-3 at the end of the section.

March 21, Spring Equinox (Figures V.2-1a,b,c)

Fort Point Channel. At this time of year, Fort Point Channel will not be affected by project shadows, except for a short period during the morning when areas near the mouth of the channel will be in shadow.

Northern Avenue. The eastern portion of Northern Avenue adjacent to the project sites will be in shadow in the early morning. For the remainder of the day, the length of Northern Avenue adjacent to the two sites will be in sun.

Commonwealth Pier 5. Pier 5 will not be affected by project shadows except late in the afternoon.

Fan Pier Canal. During the morning, the canal and its northern walkway will be open to direct sunlight, with the southern walk in shade. At noon the canal and walkways will be in shadow, with the exception of a sunlit area along a portion of the northern walkway and adjacent portion of the canal. Shadows cast by the project will shade most of the canal in the late afternoon.

Fan Pier Open Space and Park. In the morning and at noon, shadows cast by the project will shade the waterfront park. During this period, some portions of the Fan Pier Harborwalk will be in shadow while others will be in sunlight. In the afternoon, both the park and Harborwalk will provide shadowed and sunlit areas. The oval plaza and amphitheatre will be shaded by the project in the morning and again in the afternoon; at noon, these areas will be open to direct sunlight.

Pier 4 Open Space and Plaza. In the morning and afternoon, shadows cast by the project will shade the oval plaza. At noon the plaza will provide both shadowed and sunlit areas. Throughout the day, the Pier 4 Harborwalk on the west side of the site will be almost entirely shaded, while the walk on the east side will be in sunlight in the morning and early afternoon.

Fan Pier and Pier 4 Marina. During the morning and at noon, the entire marina, except for a small portion near the canal entrance, will be open to direct sunlight. A large portion of the marina will remain in direct sunlight in the afternoon with the exception of the canal entrance and a small portion of the marina's eastern edge.

June 21, Summer Solstice (Figures V.2-2a,b,c)

Fort Point Channel. In the morning a small portion of the Fort Point Channel will be in shadow. At other times of the day the channel will not be affected by project shadows.

Northern Avenue. The only shadows cast on areas of Northern Avenue will occur in the morning. Neither development will shade the street at other times of the day.

Commonwealth Pier 5. Project shadows will not affect Pier 5 at any time of the day.

Fan Pier Canal. During the morning the eastern half of the canal and the southern walkway will be in direct sunlight, while the northern walkway will be shaded. At noon, the entire canal and the northern walkway will be in sun, while the southern walkway will be shaded. In the afternoon, the canal will provide both shaded and sunlit areas, with the northern walk remaining mostly in sun and the southern walk mostly in shadow.

Fan Pier Open Space and Park. During the morning the park will provide both shaded and sunlit areas. At noon and in the afternoon shadows cast by the project will partially shade the park. In the morning the Fan Pier Harborwalk will be open to direct sun. At noon and in the afternoon, some portions of the Fan Pier Harborwalk will be in shadow, while others will be in sunlight. Throughout the day the plaza and amphitheatre will also provide both shadowed and sunlit areas.

Pier 4 Open Space and Plaza. In the morning the central portion of the plaza will be open to direct sunlight. At noon most of the plaza will be in sun. In the afternoon, the northern portion of the plaza will be in sun and the southern portion in shade. Throughout the day, the Pier 4 Harborwalk will provide both shaded and sunlit areas.

Fan Pier and Pier 4 Marina. During the morning, at noon, and in the afternoon, the entire marina, except for a small portion at the canal entrance, will be open to the sun.

December 21, Winter Solstice (Figures V.2-3a,b,c)

Fort Point Channel. Portions of Fort Point Channel and the Rowes Wharf area will be affected by project shadows during the morning hours. During other times of the day, the channel will not experience any shadow coverage from the proposed project.

Commonwealth Pier 5. Pier 5 will not be affected by project shadows except in the late afternoon.

Northern Avenue. Northern Avenue will not be shaded by the projects at any time of the day.

Fan Pier Canal. Project shadows will cover most of the canal and walkways throughout the day, with a few patches of sunlight on the canal in the afternoon.

Fan Pier Open Space and Park. Project shadows will cover the waterfront park throughout the day. In the morning and at noon, shadows cast by the project will shade the Fan Pier Harborwalk except for the portion on the northeast corner of the Fan Pier. In the afternoon, most of the Harborwalk will be in shadow with the exception of areas facing the Fort Point Channel. Project shadows will cover both the plaza and amphitheatre throughout the day.

Pier 4 Open Space and Plaza. The plaza will be in shadow throughout the day. The western portion of the Pier 4 Harborwalk will be in shade throughout the day, while the eastern side of Pier 4 will be in sun during the morning and early afternoon.

Fan Pier and Pier 4 Marina. During the morning and at noon, the northern portion of the marina will be open to direct sunlight. In the afternoon, project shadows will cover the marina.

■ Lesser-Scale Alternative Master Plans

Shadow conditions for the Fan Pier and Pier 4 Lesser-Scale Alternatives are shown in Figures V.2-4, V.2-5, and V.2-6 at the end of the section.

March 21, Spring Equinox (Figures V.2-4a,b,c,)

Fort Point Channel. At this time of year, Fort Point Channel will not be affected by project shadows, except for a short period during the morning when portions near the mouth of the channel will be in shadow.

Northern Avenue. The eastern part of Northern Avenue adjacent to the project sites will be shaded by the developments in the morning, but not during the rest of the day.

Commonwealth Pier 5. Pier 5 will not be affected by project shadows except in the late afternoon.

Fan Pier Canal. In the morning the canal will be open to direct sunlight. The northern walkway also will be open to the sun, but the southern walkway will be in shadow. At noon much of the canal and its walkways will be in shadow, except a small area of the canal and a portion of the northern walkway. In the late afternoon, project shadows will shade the canal and its walks except for an area at the western end.

Fan Pier Open Space and Park. In the morning and at noon, some portions of the waterfront park will be in shadow and others will be in sunlight. In the afternoon, project shadows will shade the park. Throughout the day, the Fan Pier Harborwalk will provide both shadowed and sunlit areas. In the morning and afternoon, the plaza and amphitheatre will be in shadow. At noon these two areas will be open to direct sun. The east side of the Fan Pier will be in sunlight in the morning and at noon.

Pier 4 Open Space and Plaza. Throughout the day, both the plaza and Pier 4 Harborwalk will provide both sunlit and shadowed areas. At noon a large part of the plaza will be in full sun.

Fan Pier and Pier 4 Marina. Most of the marina will be sunlit throughout the day.

June 21, Summer Solstice (Figures V.2-5a,b,c)

Fort Point Channel. Fort Point Channel will not be affected by project shadows except a small area adjacent to the southwest corner of the site which will be shaded in the morning.

Northern Avenue. The only shadows on areas of Northern Avenue will occur in the morning. Neither development will shade the street at other times of the day.

Commonwealth Pier 5. Project shadows will not affect Pier 5 except in the late afternoon.

Fan Pier Canal. During the morning, the eastern half of the canal will be in direct sunlight. Much of the length of the southern walkway will be open to the sun, while the northern walkway will be in shade. At noon all of the canal and northern walkway will be in sunlight while the southern walkway will be in shade. In the afternoon, the canal will provide both shaded and sunlit areas. Most of the northern walk will remain in the sun and the southern walk will be shaded.

Fan Pier Open Space and Park. Throughout the day, the park will provide shaded and sunlit areas, while most of the Fan Pier Harborwalk will be in sunlight. In the morning the plaza will be shaded by project shadows and the amphitheatre will be open to the sun. At noon the plaza will be sunlit and the amphitheatre will be shaded. In the afternoon, the plaza and amphitheatre will provide both shaded and sunlit areas.

Pier 4 Open Space and Plaza. Project shadows will cover the plaza in the morning. At noon and in the afternoon, the plaza will be predominately in sunlight. Throughout the day, there will be stretches of shadow and stretches of sunlight along the Pier 4 Harborwalk.

Fan Pier and Pier 4 Marina. In the morning, the entire marina, with the exception of a small portion of the canal entrance, will be open to the sun. At noon and in the late afternoon, the marina will be in direct sun except for a small band of shadow near its eastern edge.

December 21, Winter Solstice (Figures V.2-6a,b,c)

Fort Point Channel. Portions of Fort Point Channel and Rowes Wharf will be affected by project shadows during the morning hours. However, the channel will not experience any shadow coverage from the proposed projects during other times of the day.

Northern Avenue. In the winter Northern Avenue will not be shaded by the developments.

Commonwealth Pier 5. Pier 5 will not be affected by project shadows except in the late afternoon.

Fan Pier Canal. Project shadows will cover most of the canal and walkways throughout the day, with a few patches of sunlight on the canal in the late afternoon.

Fan Pier Open Space and Park. Throughout the day, small sunlit areas will be in the waterfront park and along the Fan Pier Harborwalk. The plaza and amphitheatre will be shaded throughout the day.

Pier 4 Open Space and Plaza. Project shadows will cover most of the plaza during the day, with small areas of sunlight present at noon and in the afternoon. Throughout the day, the Pier 4 Harborwalk will provide both areas of sun and shadow. The east side of Pier 4 will be in sunlight for the morning and early afternoon.

Fan Pier and Pier 4 Marina. In the morning, the harbor entrance to the marina will be in sun. By noon the western portion of the marina will be sunlit while the eastern edge will be in shadow. In the afternoon, the marina will be primarily shaded but will have small sunlit areas.

OBSERVATIONS

The computer-based shadow diagrams presented in this chapter can be used to examine several shadow-related issues:

- Existing shadows
- Off-site shadows from the development projects
- On-site shadows (self-shading and cross-shading of development areas)

Each of these issues is addressed in a summary fashion, below. In most cases the development-related shadows will not differ substantially between the Initial Master Plan Proposals and the Lesser-Scale Alternatives.

Existing Shadows

The existing pier structures and the Pier 4 Restaurant cast shadows on the Inner Harbor and the cove between the piers during winter months. Commonwealth Pier 5 and the Boston Wharf Company structures along Summer Street are the only buildings in the surrounding area that cast shadows on the project sites. Shadows from Pier 5 fall on the eastern edge of Pier 4 during the early morning of the winter months, while shadows from the Boston Wharf Company buildings fall on the southern edge of Fan Pier during winter afternoons.

Off-Site Shadows from the Fan Pier and Pier 4 Developments

Shadows from the proposed developments will extend beyond the project sites throughout the year; however, the most extensive effects will occur in the winter. During the early morning hours of the winter, shadows from the proposed developments will fall on Fort Point Channel and parts of the Boston waterfront. The Inner Harbor will be affected by afternoon project shadows during the fall, winter, and spring. In the late afternoon of the winter months, project shadows will fall on the Commonwealth Pier 5 site. Northern Avenue adjacent to the sites will be subject to early morning shading by the projects in the spring, summer, and fall. The most extensive shading of Northern Avenue will occur on summer mornings. In the Lesser-Scale Alternatives the heights of buildings near the water are generally lower with taller buildings located along Northern Avenue and as focal points for each project. Some of the taller elements in the Lesser-Scale Alternatives extend the shadows cast off site--particularly on winter days--beyond those cast by the Initial Proposals.

On-Site Shadows

The Fan Pier and Pier 4 sites are located at the northernmost portion of South Boston. Consistent with various land use plans, design guidelines, and regulations for the area, building heights of the proposed developments will increase with distance from the water, leaving the water's edge as open space. This stepping away from the harbor edge results in the location of buildings to the south, open space to the north, and shadows cast onto the projects' open space.

Several on-site public areas were analyzed for their shadow conditions throughout the year. In the winter the Fan Pier canal and its walkways will be in shadow most of the day, except for a few patches of sun in the afternoon. More sunlight will reach the canal and its walkways in the spring and fall. During the summer, one walkway will usually be in sun while the other is in shade, and throughout the day the canal will be open to sunlight.

The Pier 4 plaza and the Harborwalk portions of both projects will be both shadowed and sunlit throughout the year. Direct sun will fall on the eastern side of both Fan Pier and Pier 4 in the morning and at noon throughout the year. Except for early morning and late afternoon periods in winter, the proposed marina will be in sunlight.

For both developments, the Lesser-Scale Alternative designs minimize "self-shading" of the proposed public open spaces. At Fan Pier, building masses near the waterfront park were reduced in height and programmatic area, and made more slender, reducing shadows on the waterfront park, Harborwalk, canal, and the marina. Similarly, the Pier 4 Lesser-Scale Alternative provides clear setbacks, stepbacks, and thinner building masses, lessening shadows on Harborwalk, the new plaza, and marina.

The beneficial effects of these changes for the Lesser-Scale Alternatives will occur mainly in the spring, summer, and fall, although small benefits to the daylighting of public spaces will occur in the winter, too. In particular, the Lesser-Scale Alternatives experience more sun on their public open spaces than the Initial Proposals during the morning and at noon for the Spring Equinox and Winter Solstice.

Cross-shading between the two developments will not be a major effect. Because Pier 4 is loated southeast of Fan Pier, the Pier 4 Development will shade portions of the Fan Pier Development. This cross-shading effect will be most noticeable during winter mornings and at midday, but to a lesser extent with the Lesser-Scale Alternative than with the Initial Proposal. Some shading of the Pier 4 plaza will be caused by the Fan Pier building closest to Pier 4 along Northern Avenue, during the late afternoon in spring and summer.

FIGURE V.2-1a
Project
Area
Shadow
Conditions

Initial Proposals

March 21
9:00 am

▨ New Shadow

░ Existing Shadow

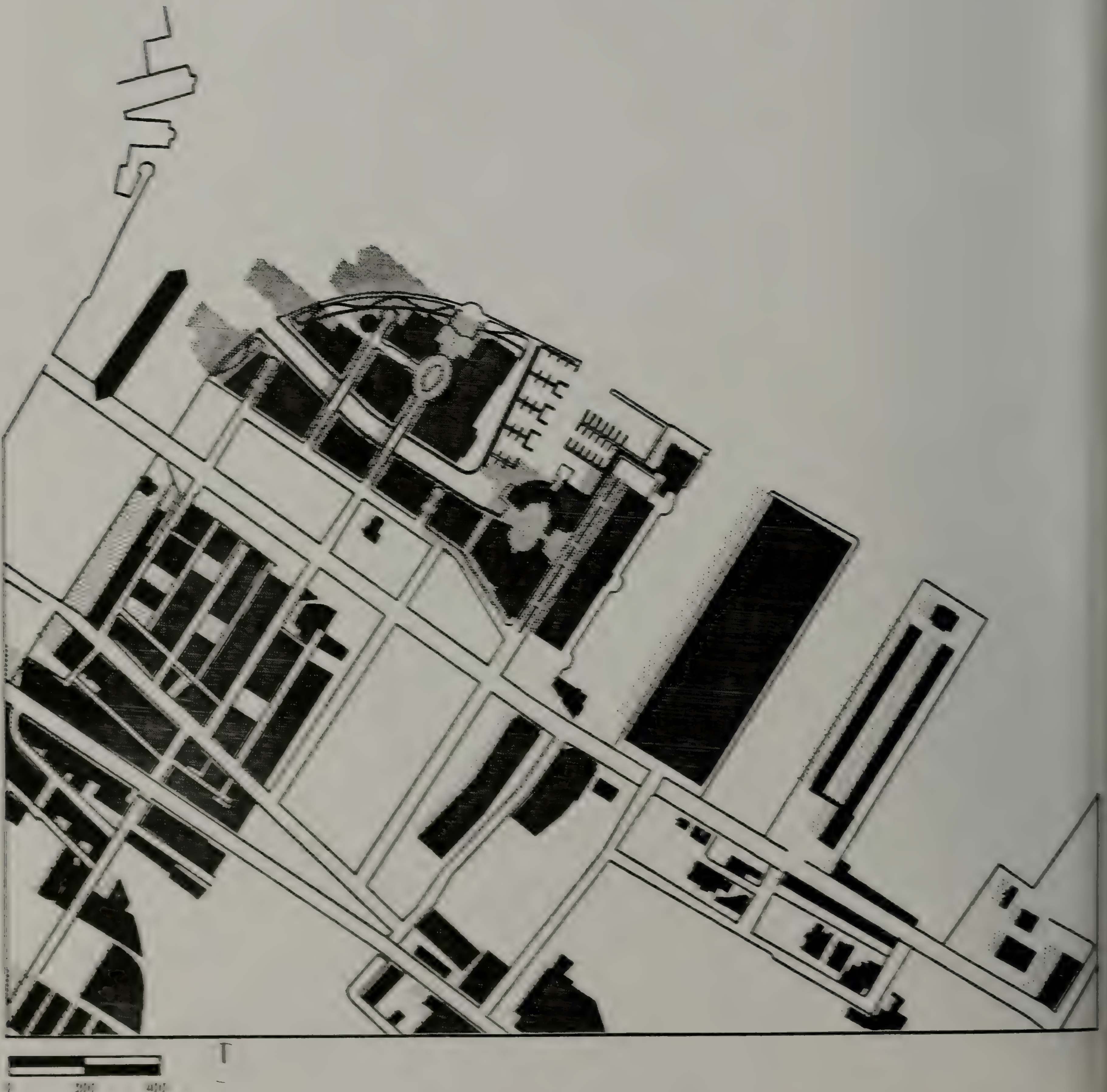


FIGURE V.2-1b
Project
Area
Shadow
Conditions

Initial Proposals

March 21
12:00 noon

▨ New Shadow

░ Existing Shadow

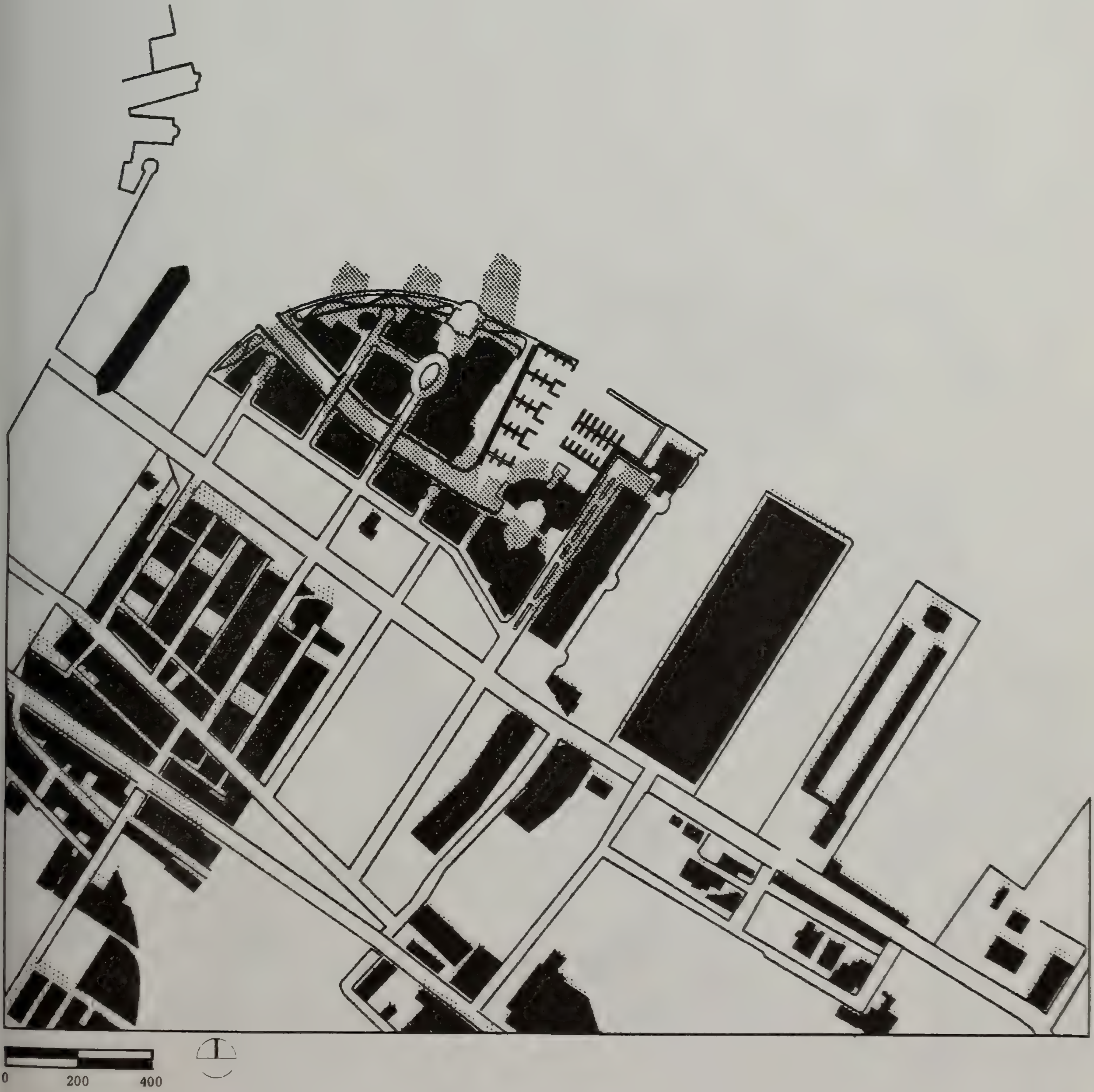


FIGURE V.2-1c
Project
Area
Shadow
Conditions

Initial Proposals

March 21
3:00 pm

▩ New Shadow

░ Existing Shadow

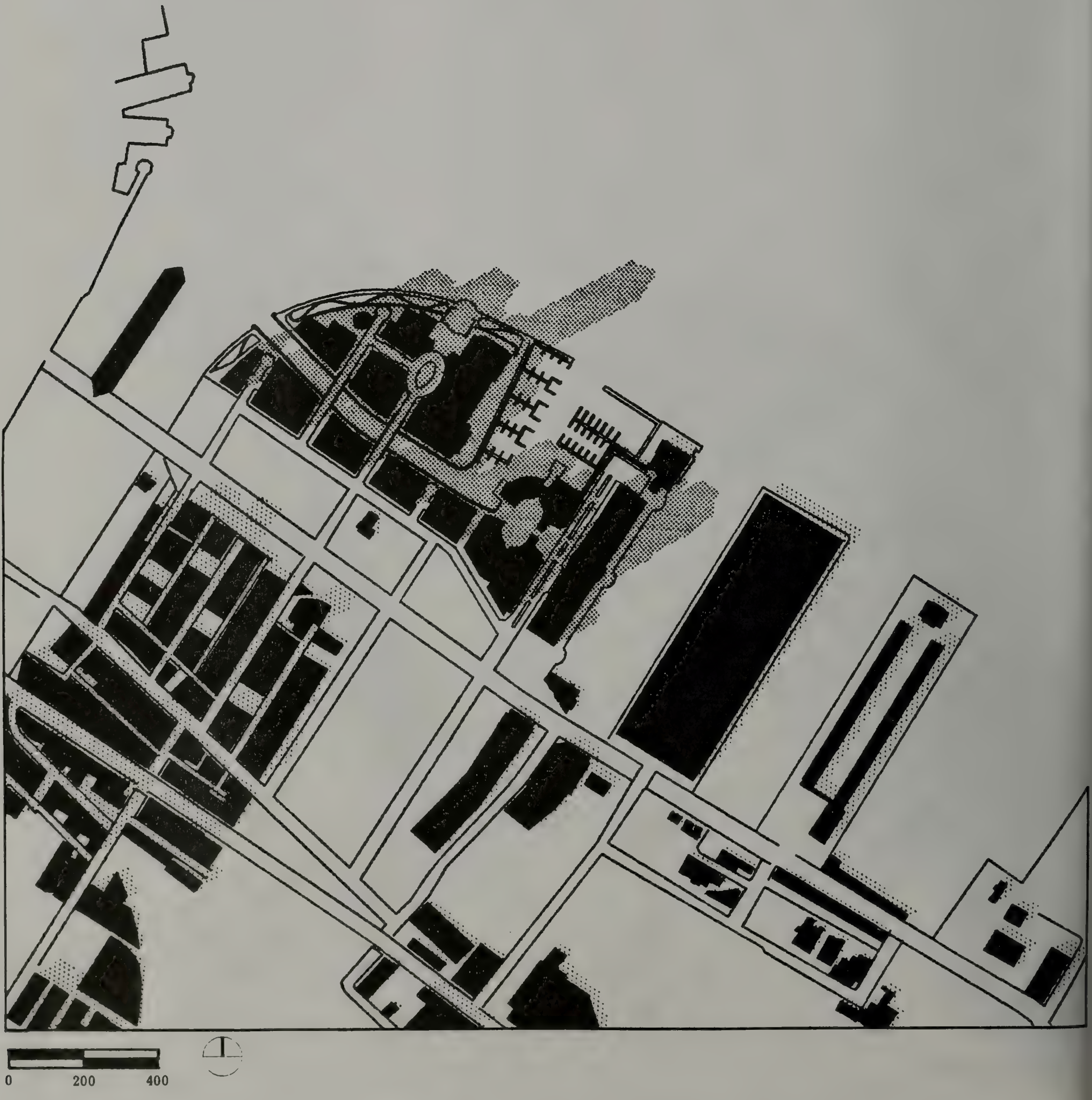


FIGURE V.2-2a
Project
Area
Shadow
Conditions

Initial Proposals

June 21
9:00 am

▨ New Shadow

░ Existing Shadow

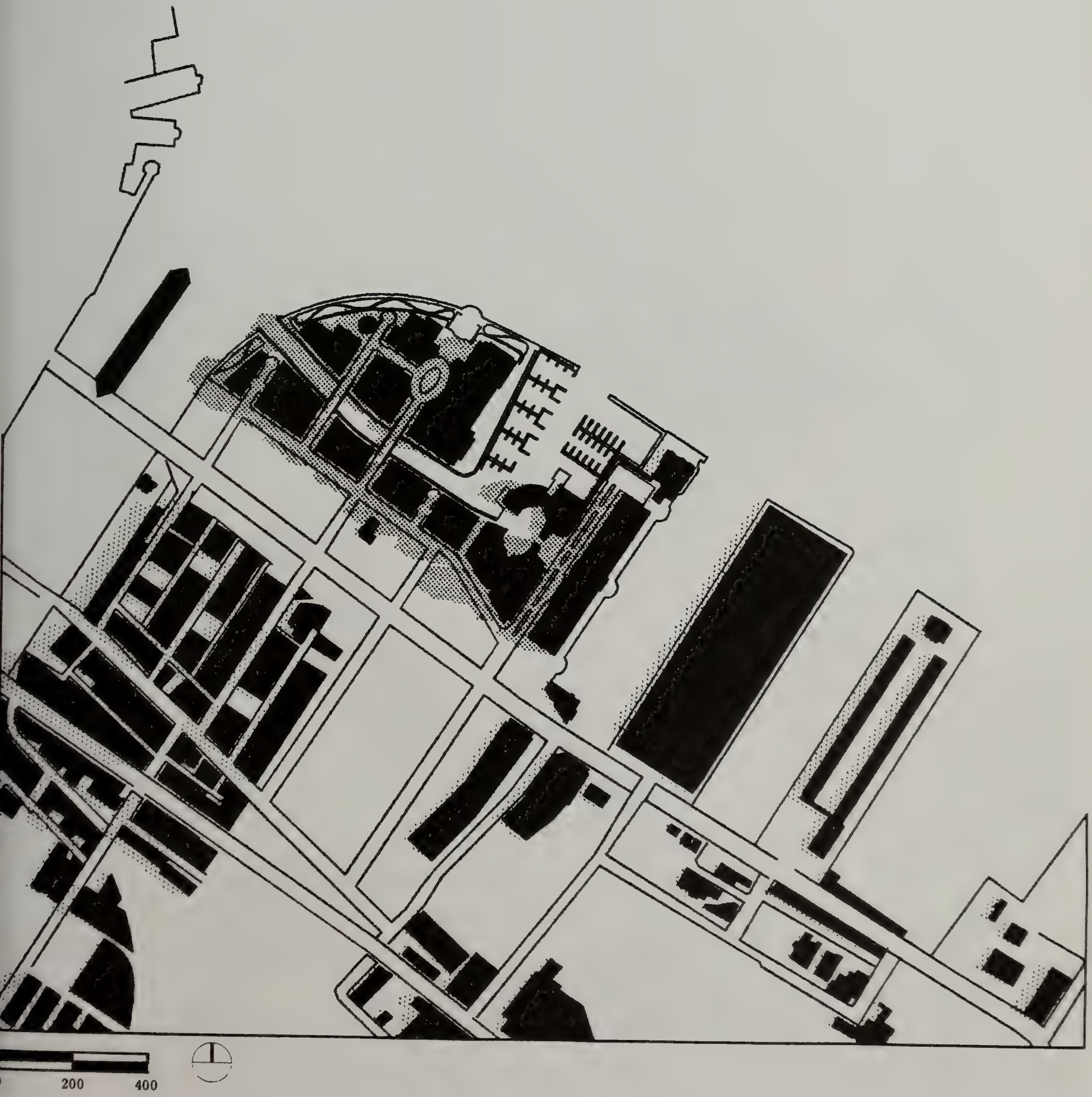


FIGURE V.2-2b
Project
Area
Shadow
Conditions

Initial Proposals

June 21
12:00 noon

▩ New Shadow

▨ Existing Shadow

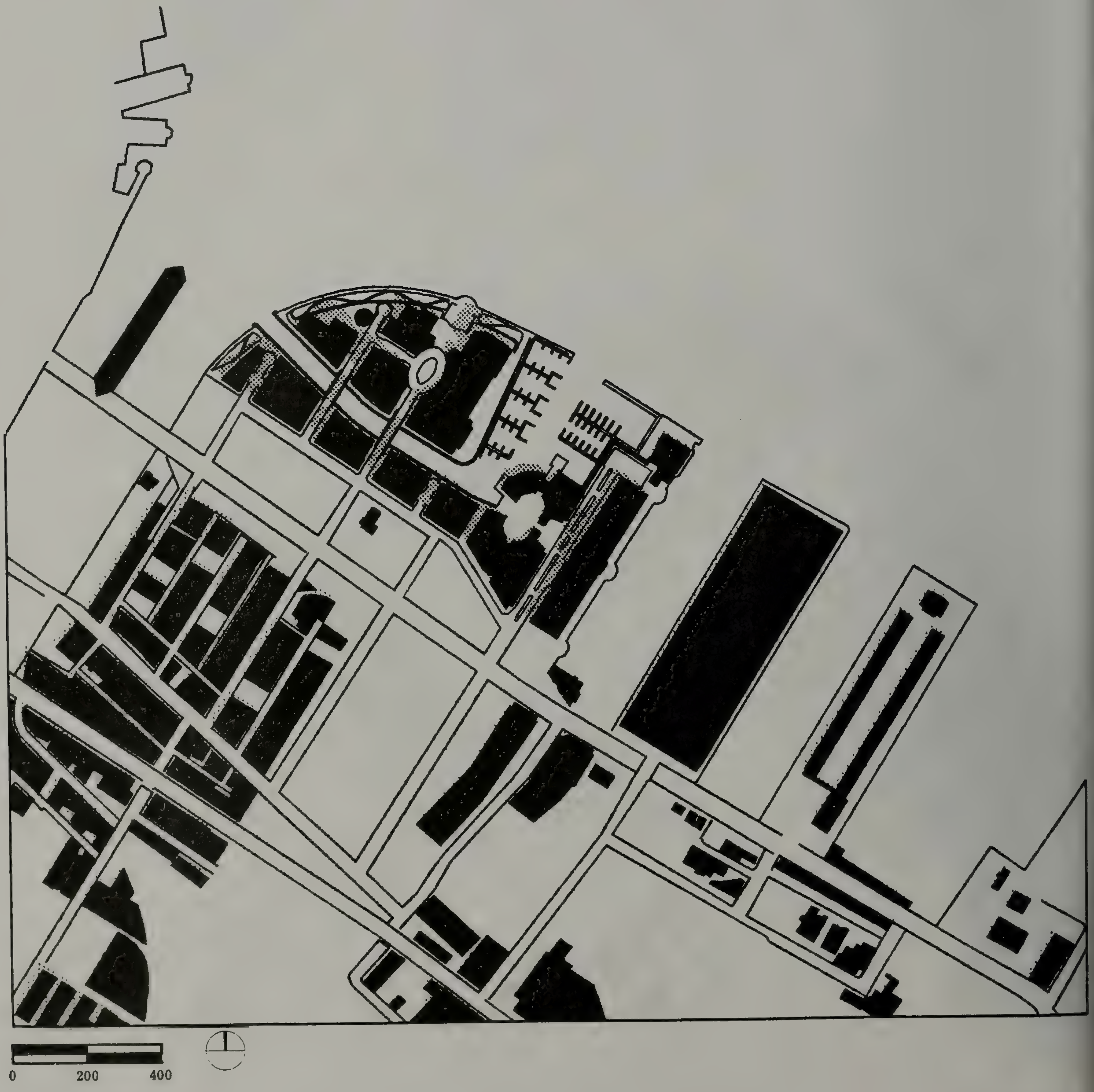


FIGURE V.2-2c
Project
Area
Shadow
Conditions

Initial Proposals

June 21
3:00 pm

▨ New Shadow

░ Existing Shadow

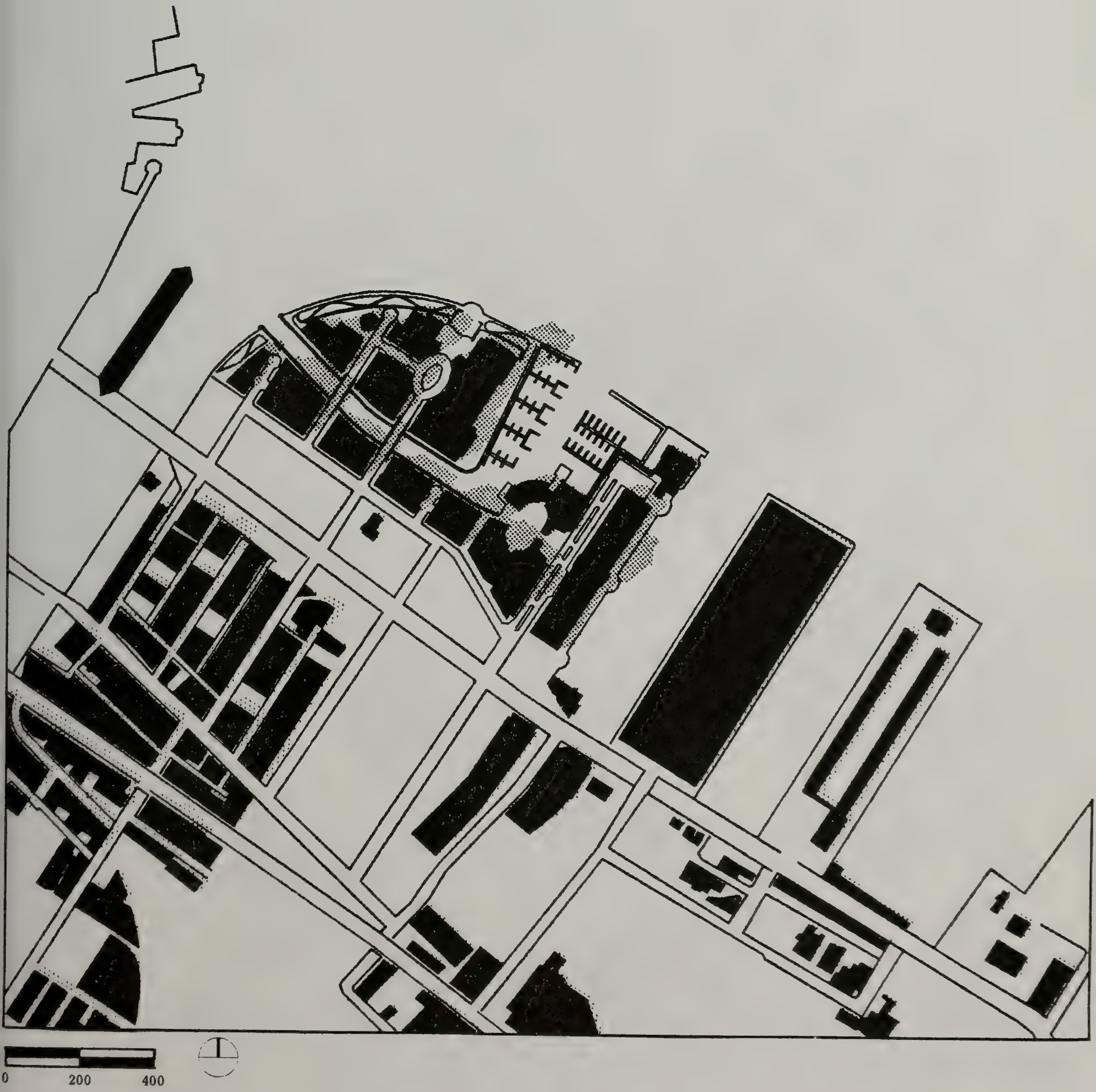


FIGURE V.2-3a
Project
Area
Shadow
Conditions

Initial Proposals

December 21
9:00 am

▩ New Shadow

▨ Existing Shadow

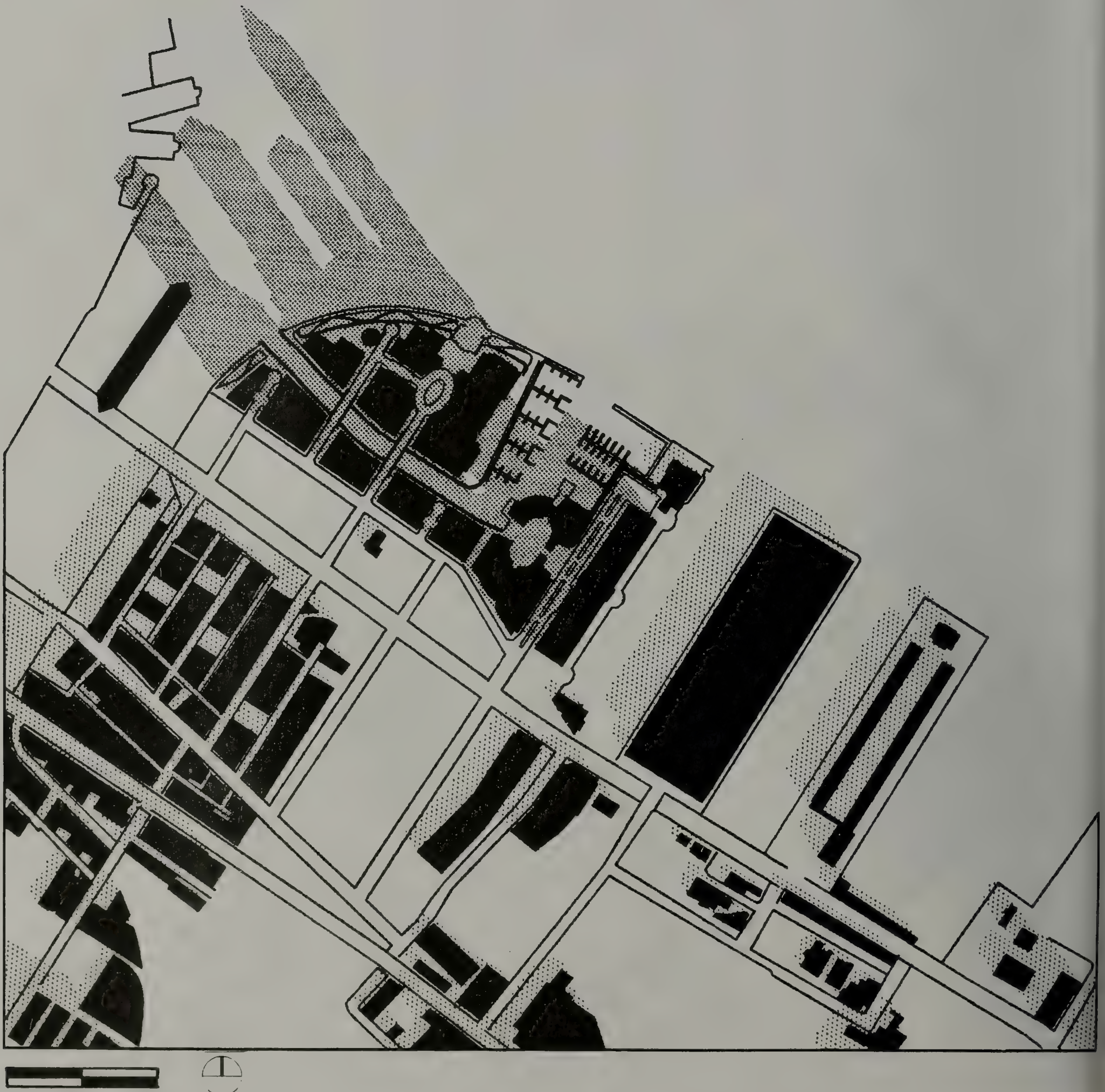


FIGURE V.2-3b
Project
Area
Shadow
Conditions

Initial Proposals

December 21
12:00 noon

▨ New Shadow

░ Existing Shadow

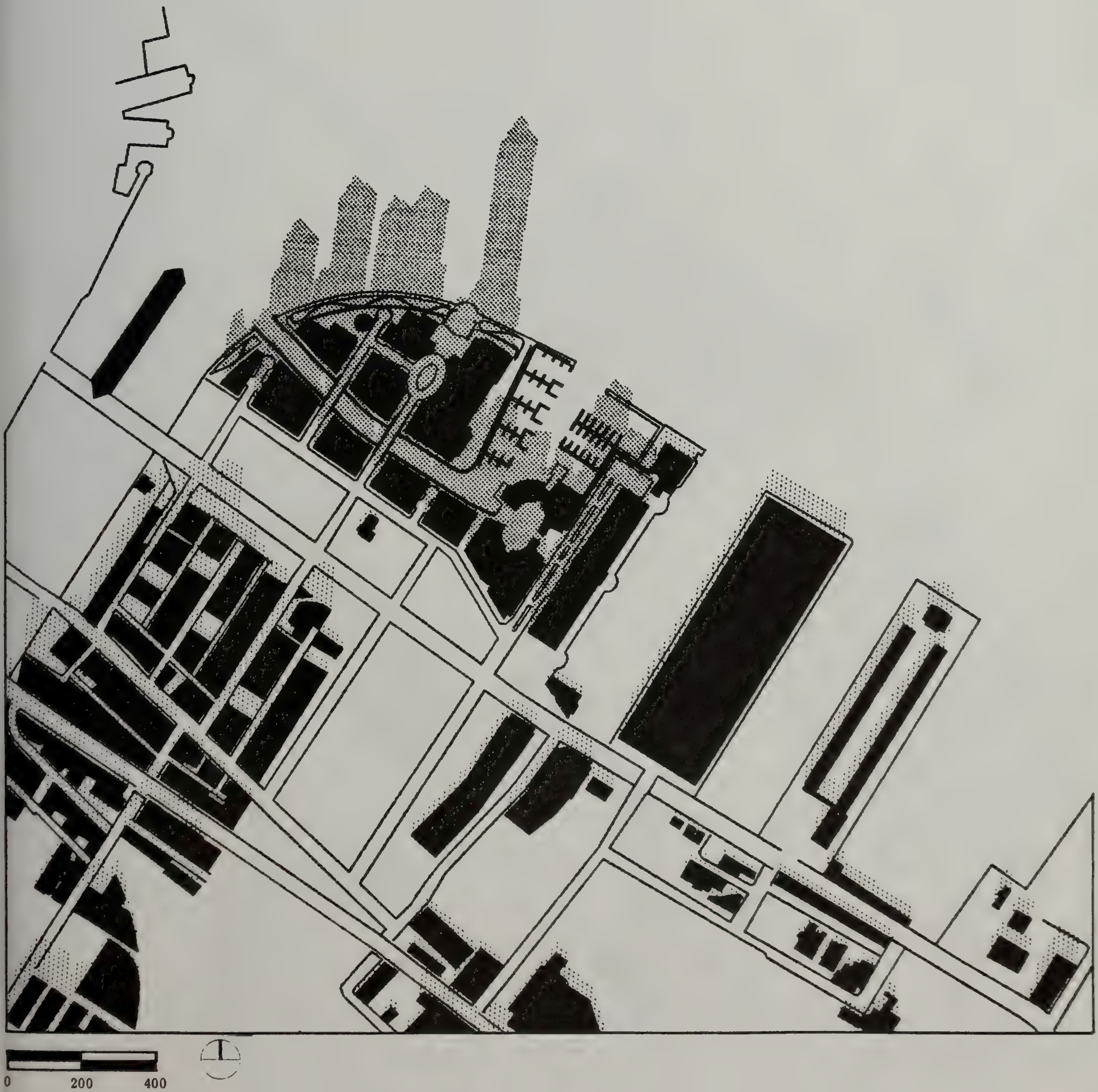


FIGURE V.2-3c
Project
Area
Shadow
Conditions

Initial Proposals

December 21
3:00 pm

▩ New Shadow

▨ Existing Shadow

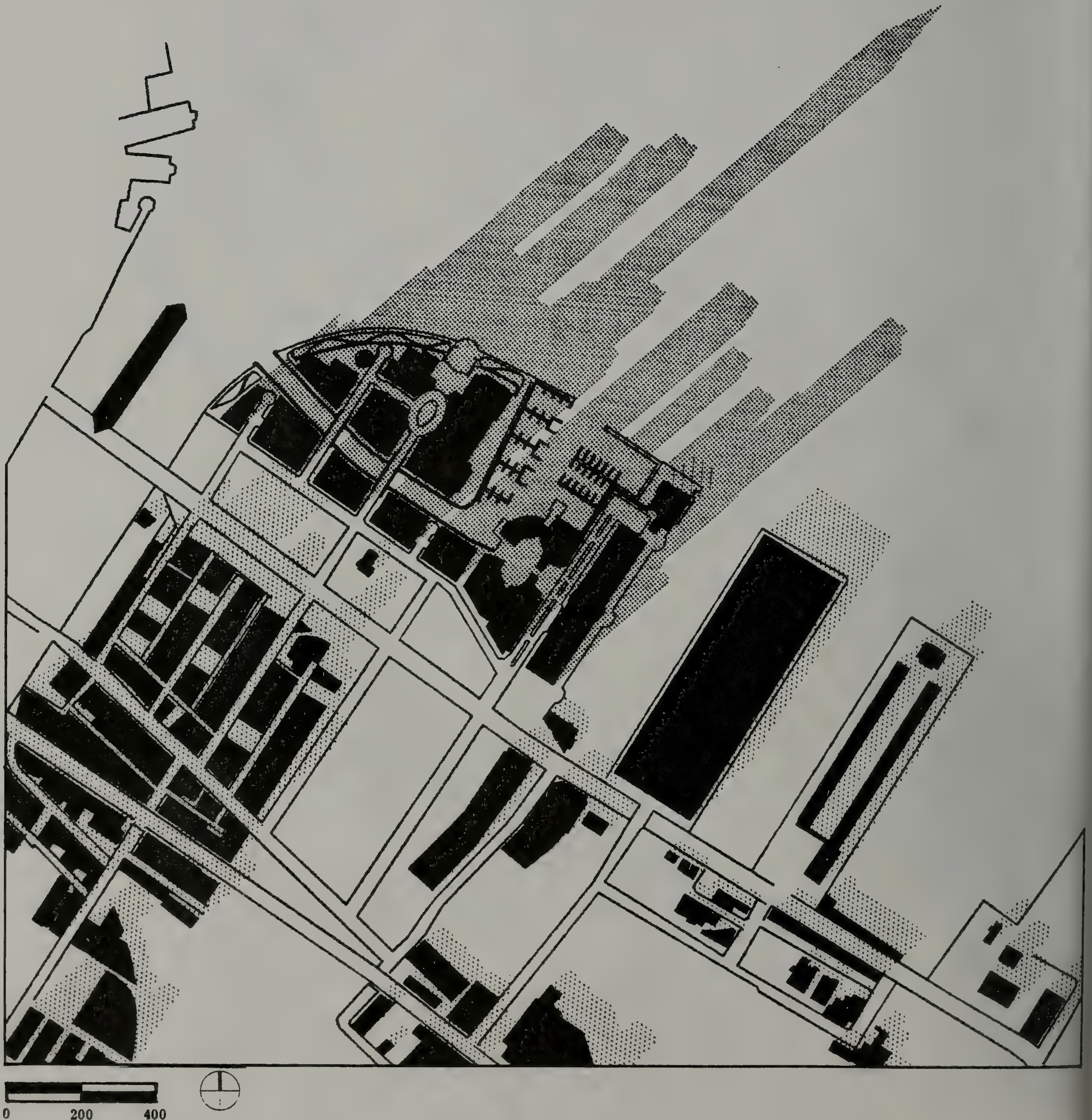


FIGURE V.2-4a
Project
Area
Shadow
Conditions

Lesser-Scale
Alternatives

March 21
9:00 am

▨ New Shadow

░ Existing Shadow

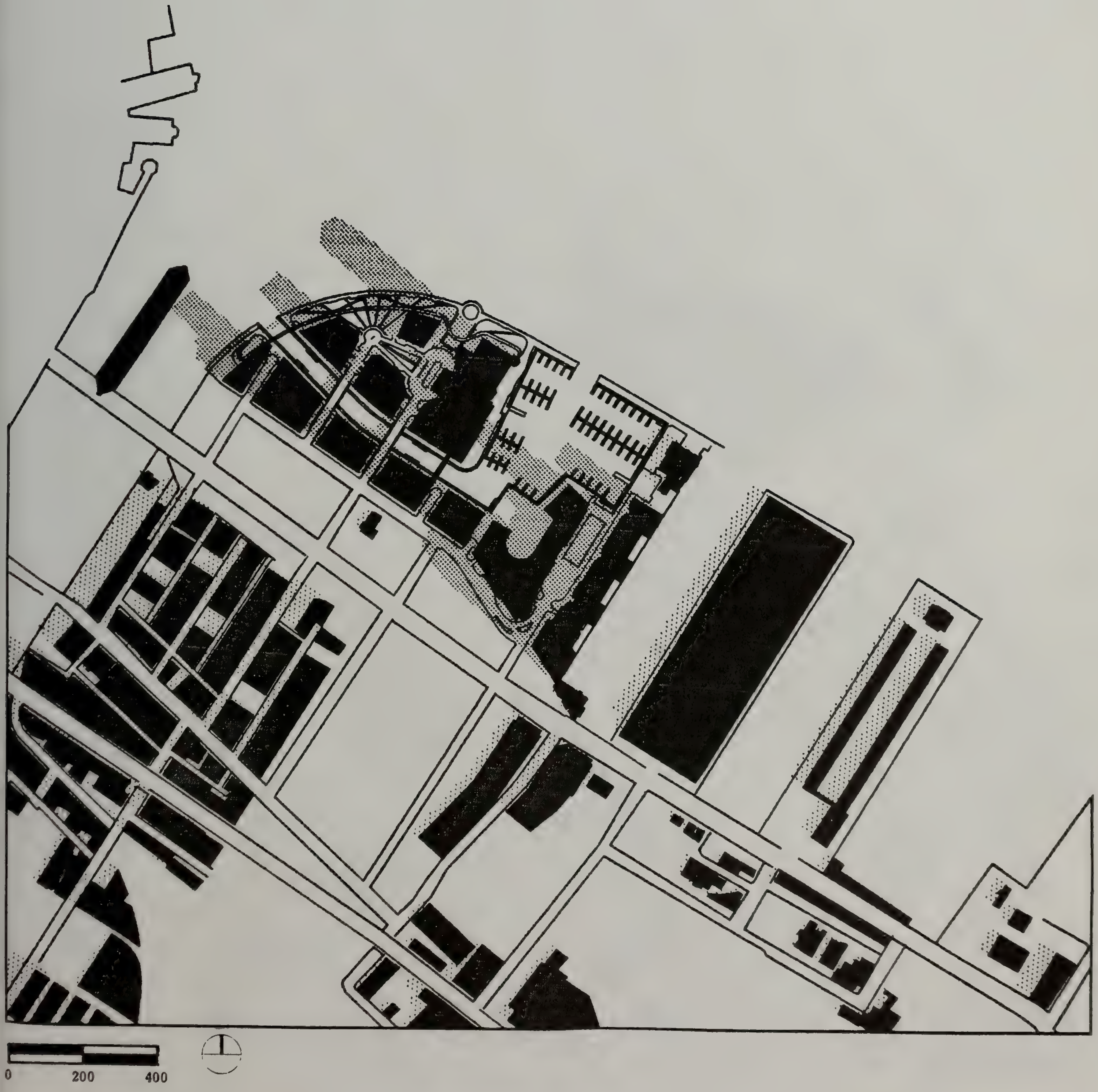


FIGURE V.2-4b
Project
Area
Shadow
Conditions

Lesser-Scale
Alternatives

March 21
12:00 noon

▨ New Shadow

░ Existing Shadow

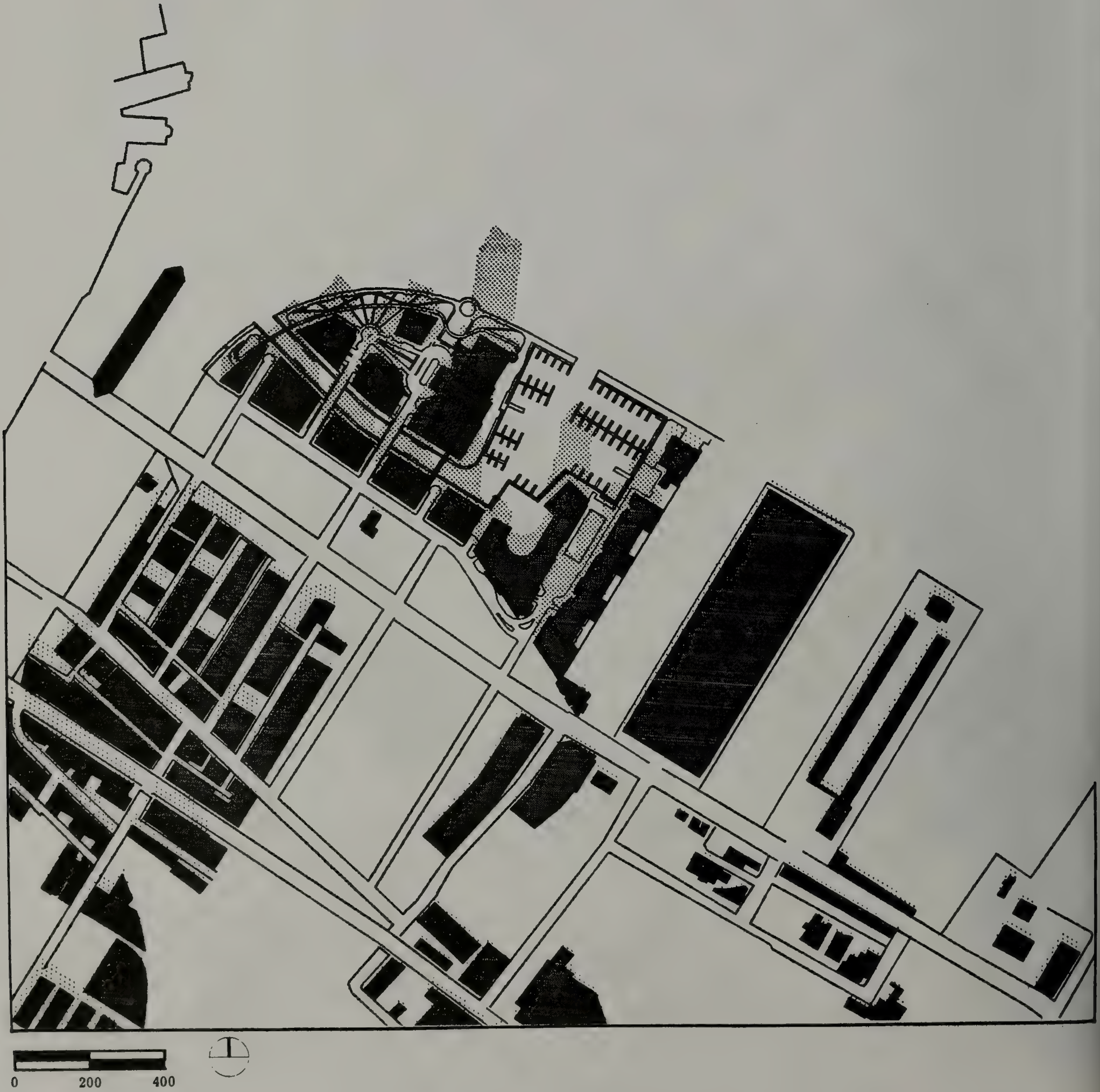


FIGURE V.2-4c
Project
Area
Shadow
Conditions

Lesser-Scale
Alternatives

March 21
3:00 pm

▨ New Shadow

░ Existing Shadow

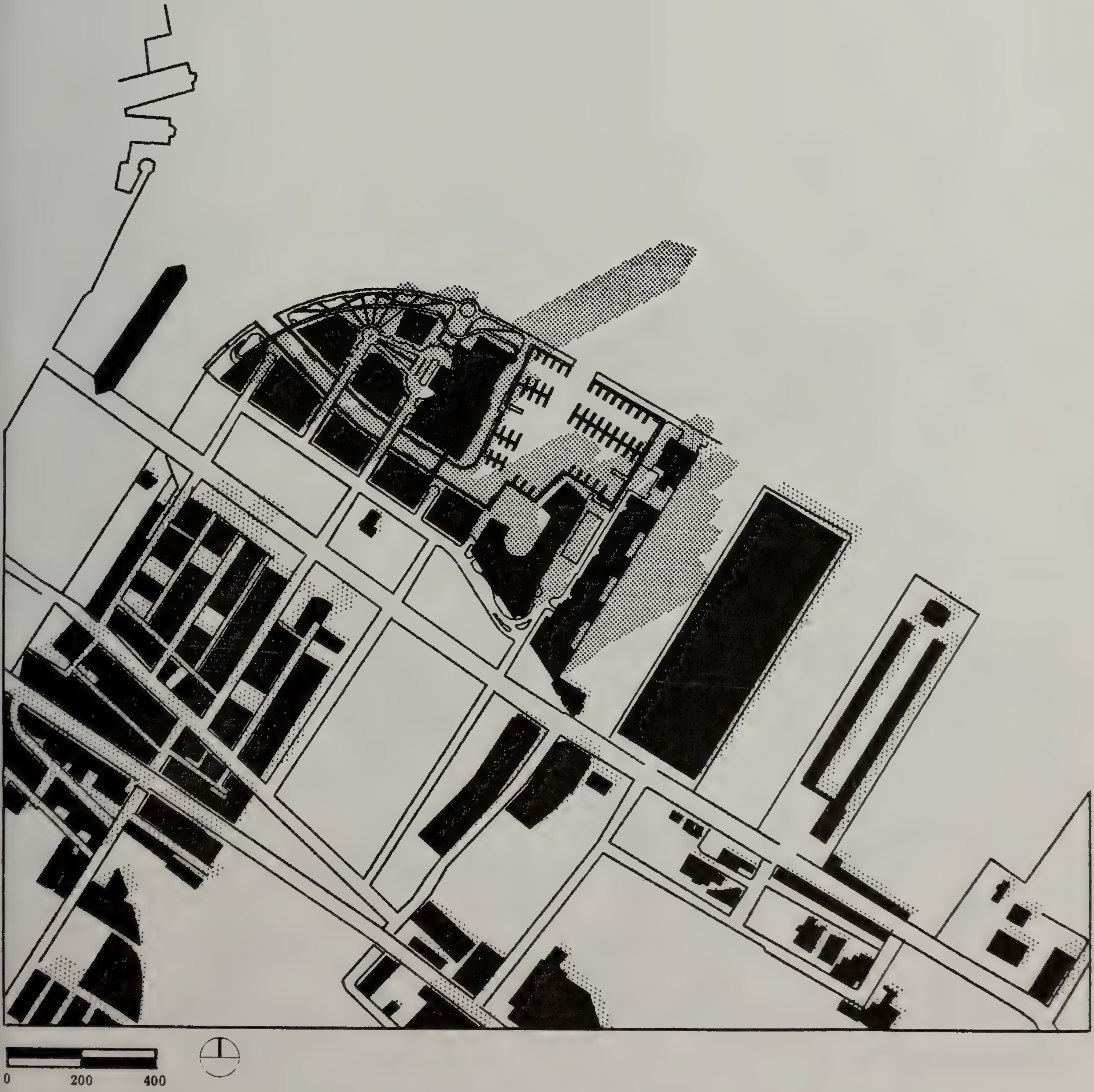


FIGURE V.2-5a
Project
Area
Shadow
Conditions

Lesser-Scale
Alternatives

June 21
9:00 am

▓ New Shadow

░ Existing Shadow

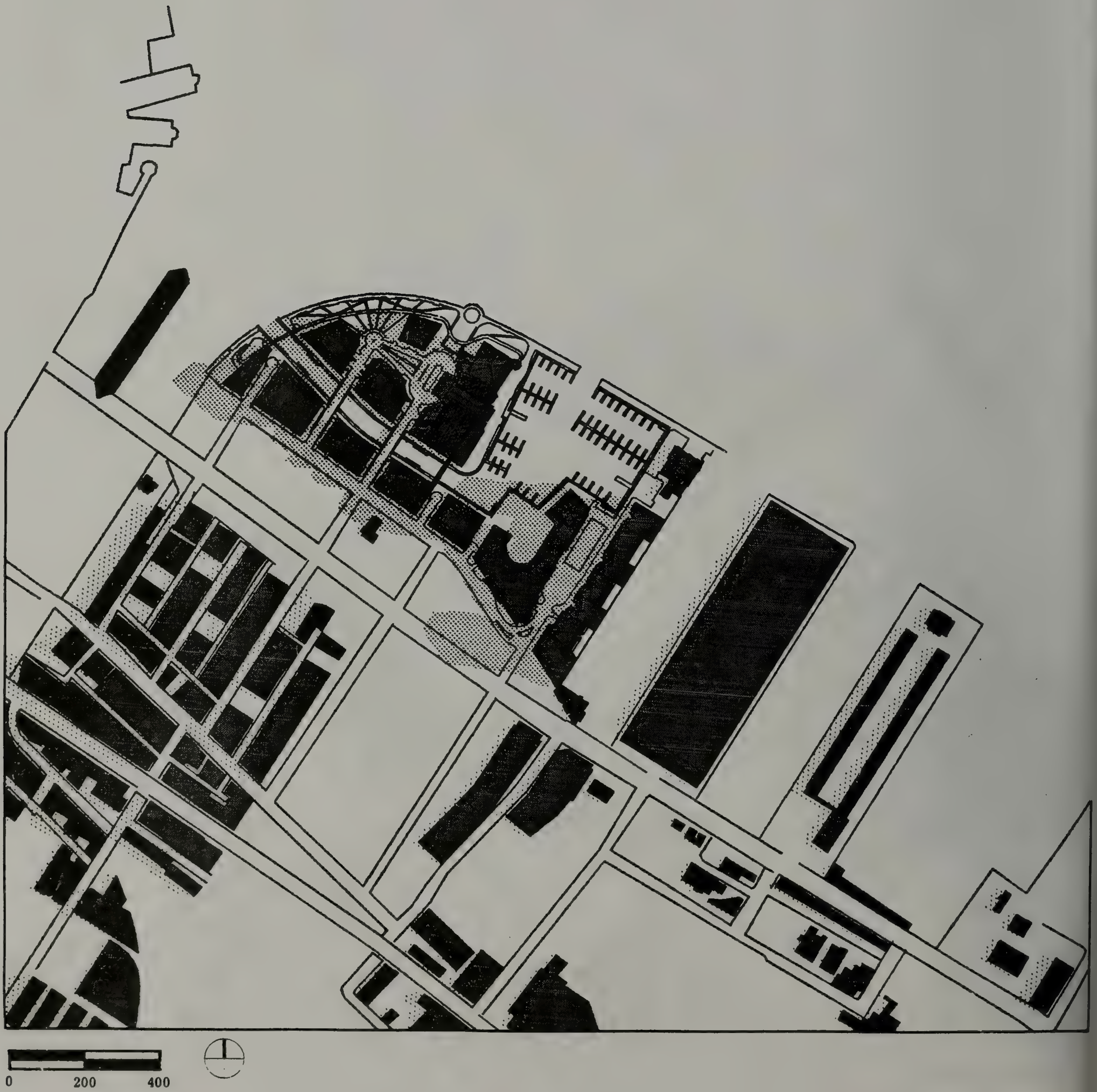


FIGURE V.2-5b
Project
Area
Shadow
Conditions

Lesser-Scale
Alternatives

June 21
12:00 noon

▨ New Shadow

░ Existing Shadow

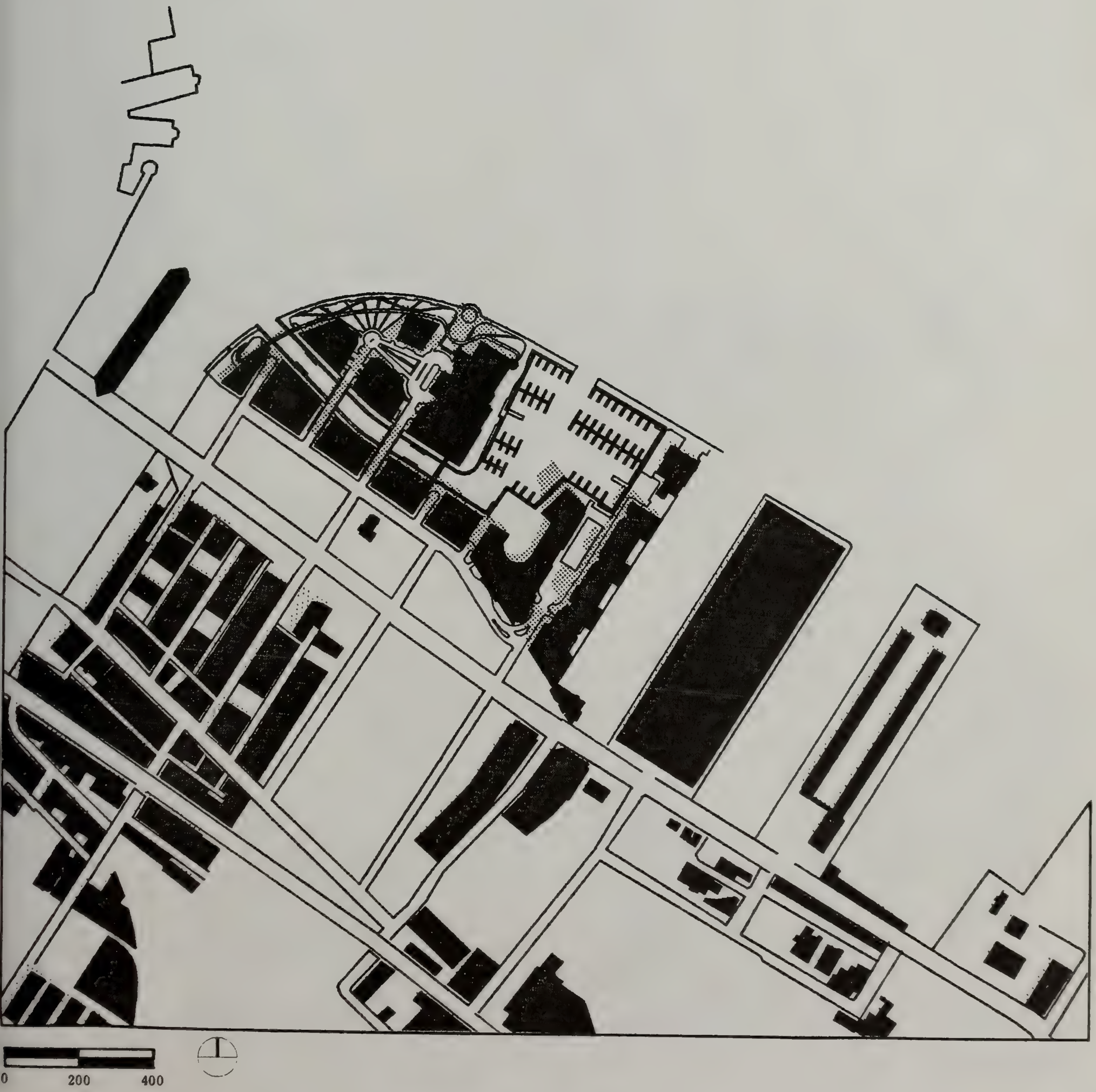


FIGURE V.2-5c
Project
Area
Shadow
Conditions

Lesser-Scale
Alternatives

June 21
3:00 pm

▨ New Shadow

▨ Existing Shadow

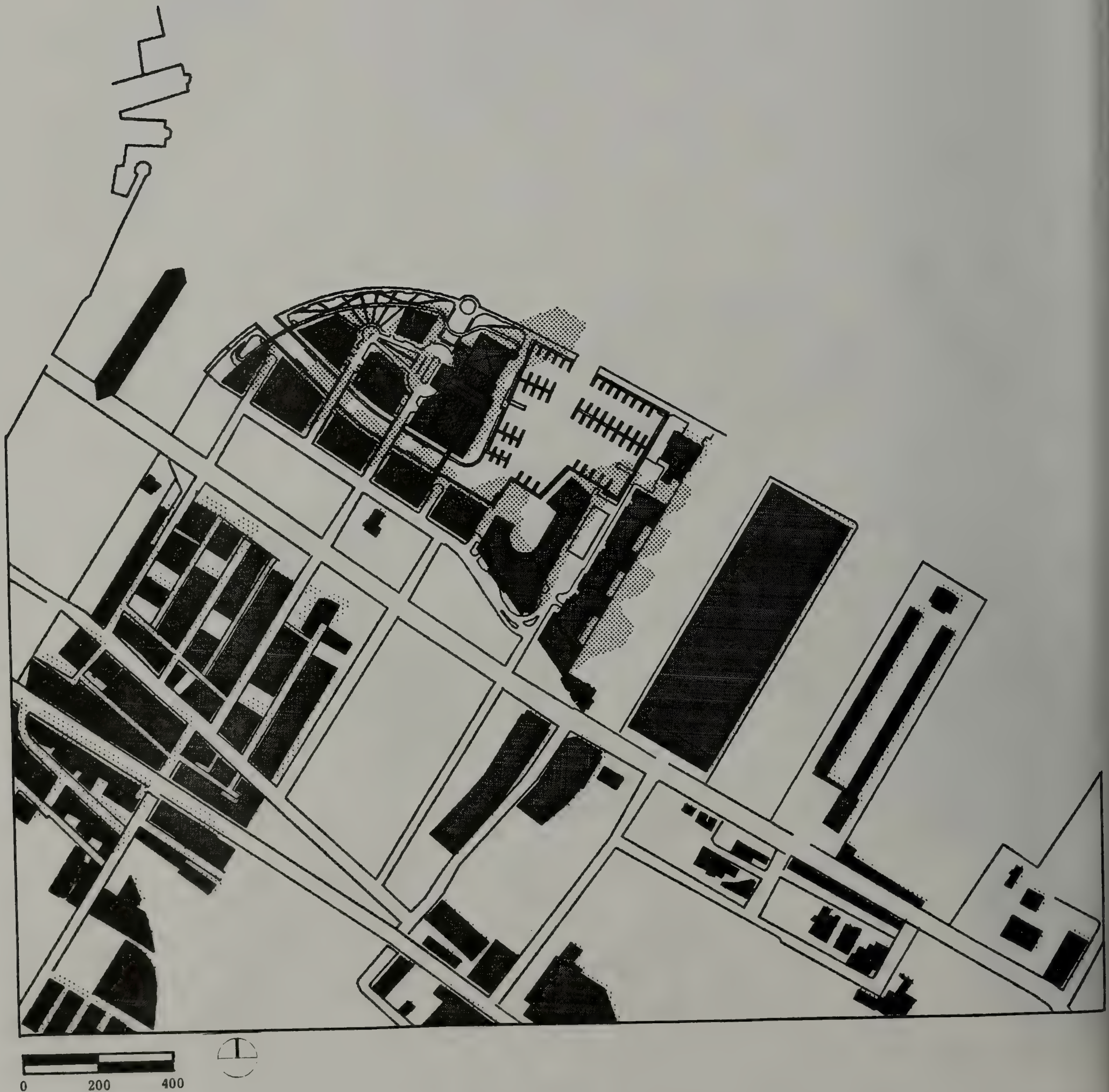


FIGURE V.2-6a
Project
Area
Shadow
Conditions

Lesser-Scale
Alternatives

December 21
9:00 am

▨ New Shadow

░ Existing Shadow

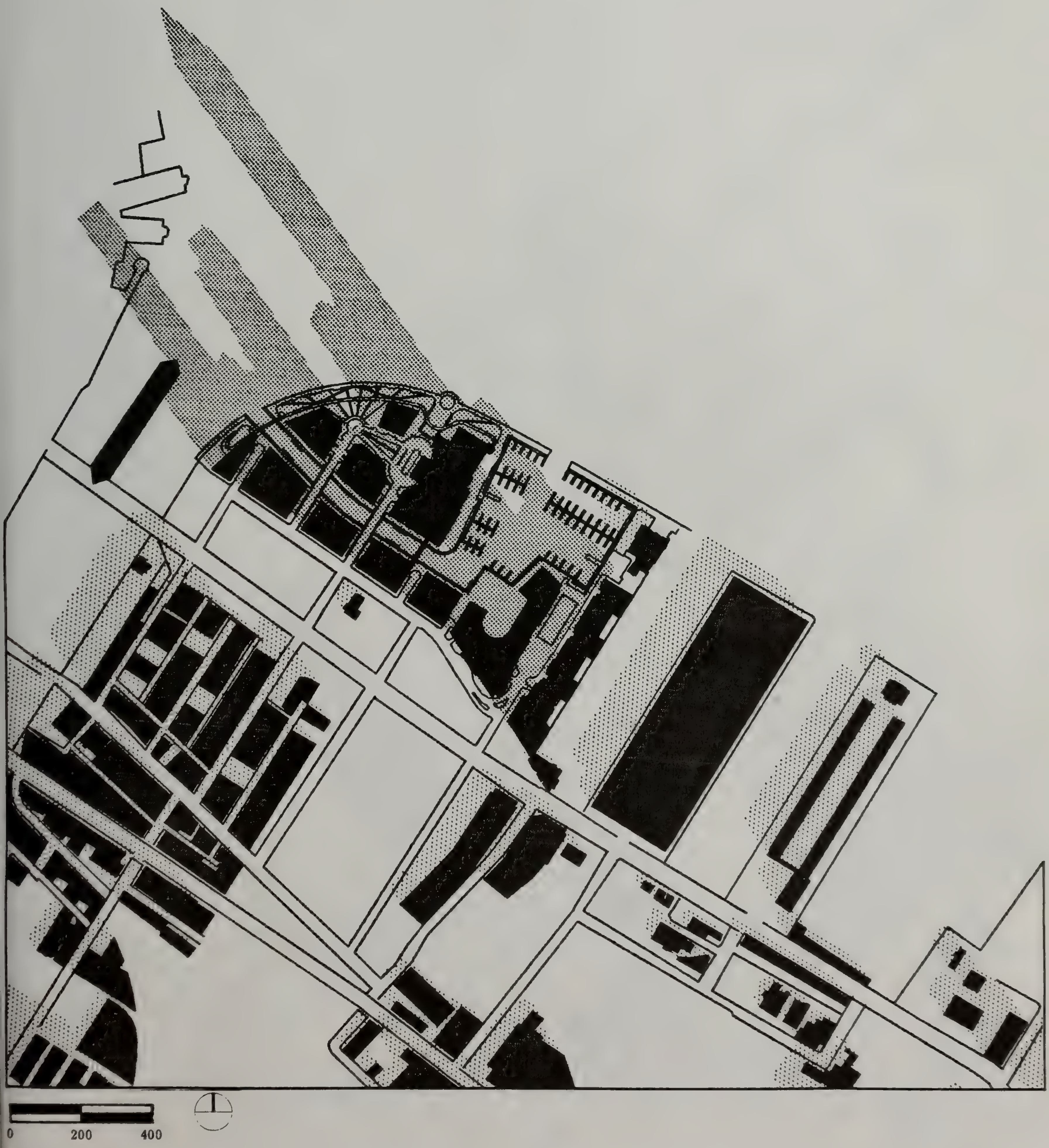


FIGURE V.2-6b
Project
Area
Shadow
Conditions

Lesser-Scale
Alternatives

December 21
12:00 noon

▩ New Shadow

░ Existing Shadow

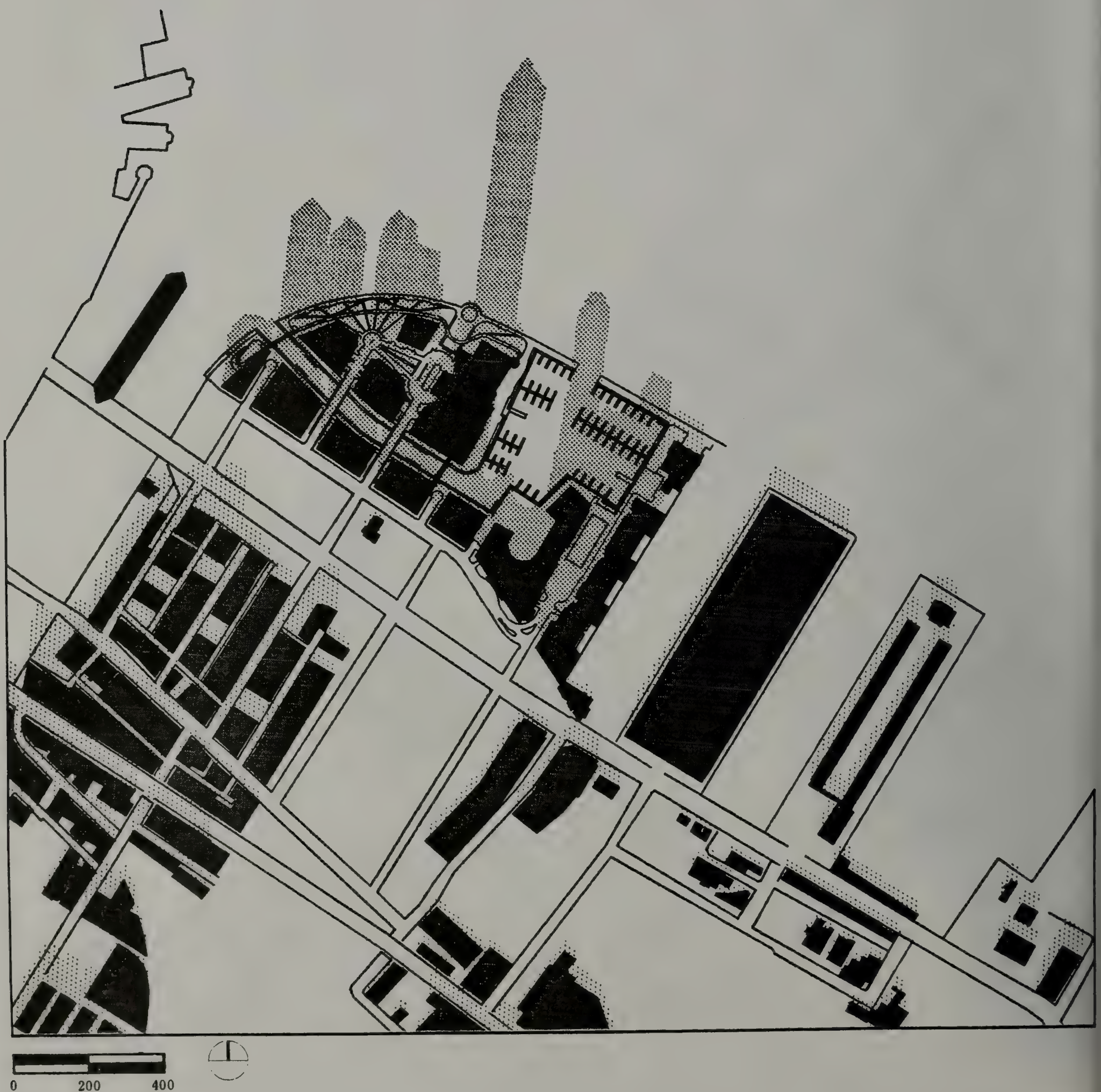


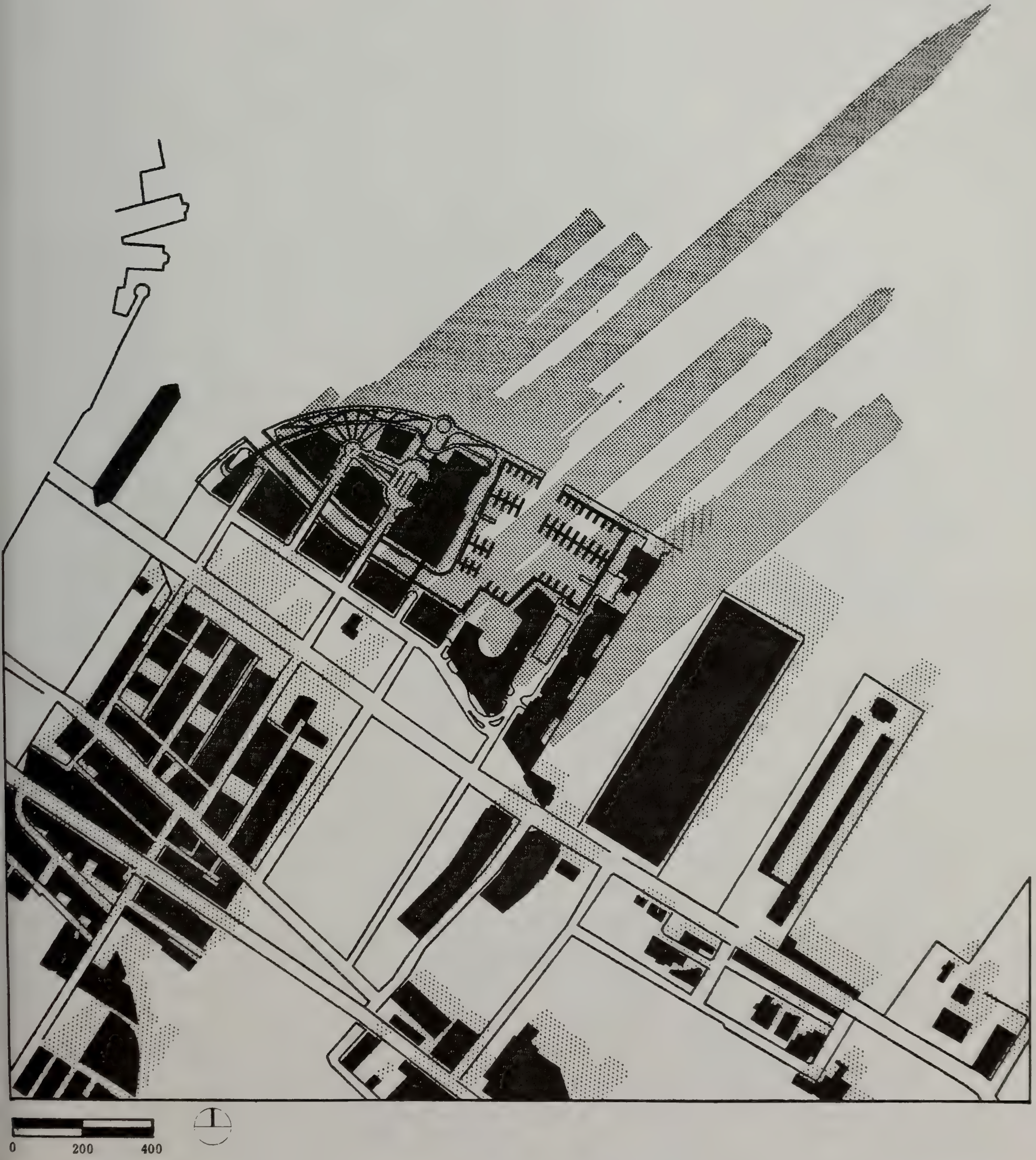
FIGURE V.2-6c
Project
Area
Shadow
Conditions

Lesser-Scale
Alternatives

December 21
3:00 pm

▨ New Shadow

░ Existing Shadow



V.3

Urban Design Issues
Wind

INTRODUCTION

As part of the design process of the Fan Pier Development and Pier 4 Development Master Plans, studies have been conducted to assess the possible effects of the proposed developments on the ground wind environment in and around the project sites. The Wright Brothers Memorial Wind Tunnel (WBWT) at the Massachusetts Institute of Technology has conducted an initial qualitative wind erosion study to identify areas of the sites that may experience high winds due to project development. This analysis, tailored to the master plan level of design, will subsequently guide more detailed quantitative studies of the Fan Pier and Pier 4 Master Plan Alternatives and possible mitigation measures. In-depth, quantitative wind tunnel testing will be conducted when schematic designs for the buildings and public open spaces are available.

Preliminary wind erosion test data has been compiled for the following three master plan alternatives for the development of Fan Pier and Pier 4:

- No-Build;
- Initial Master Plan Proposals for the Fan Pier and Pier 4 Developments; and
- Lesser-Scale Alternative for the Fan Pier Development, and a preliminary, lesser-scale alternative for the Pier 4 Development.

The wind erosion analysis that includes the most recent Pier 4 Lesser-Scale Alternative will be completed in January, 1986. Data from this analysis will be presented in the Final EIR. However, the overall massing of the preliminary Lesser-Scale Alternative that was tested for Pier 4 is sufficiently similar to the Lesser-Scale Alternative as described in Chapter III, so that initial predictions of wind conditions due to development of this alternative can be made based on the available data.

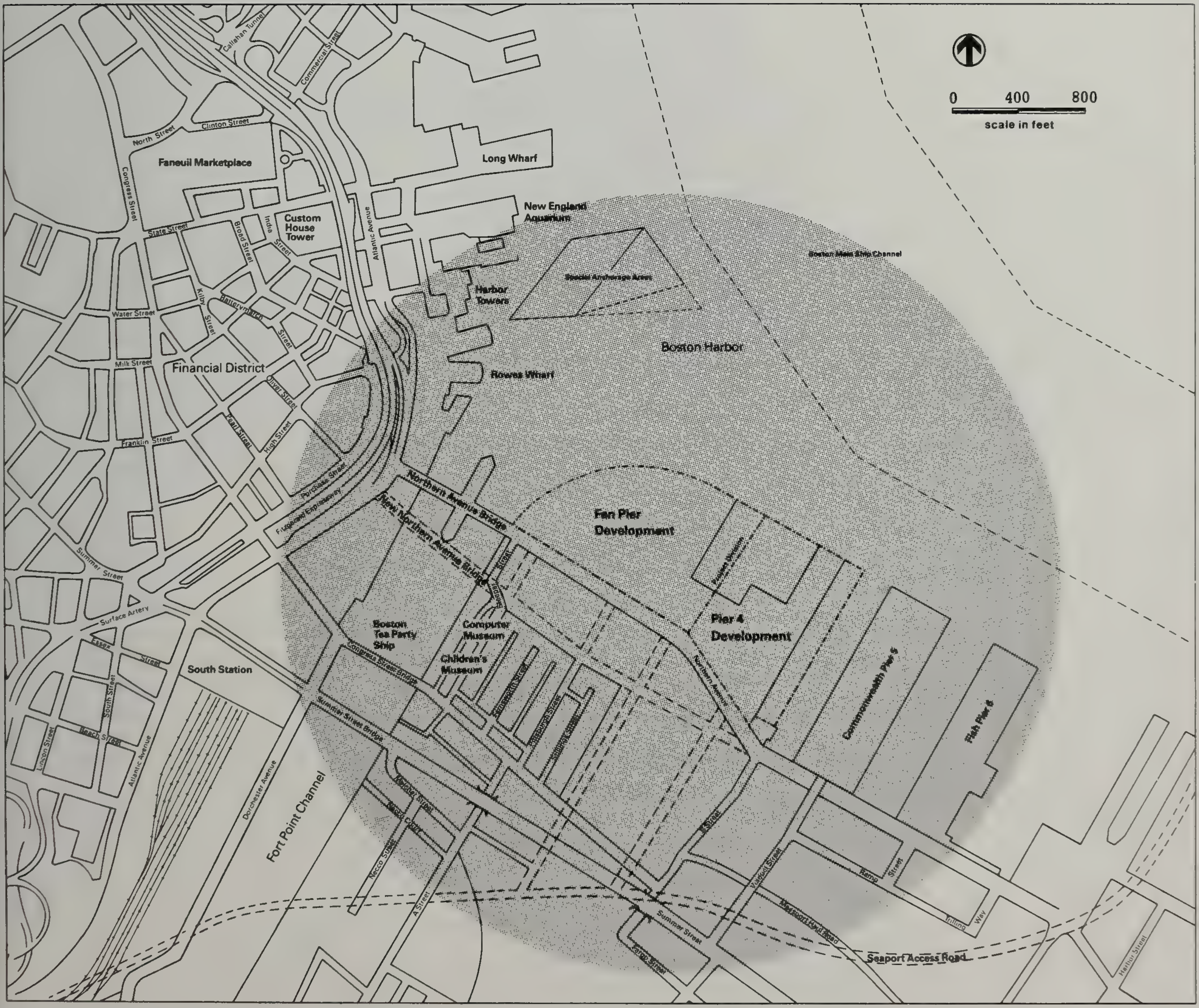
METHODOLOGY

■ Wind Erosion Test

To study the ground wind environment of the Fan Pier and Pier 4 Development Master Plan Alternatives, a 1:600 scale model of the project sites and the surrounding area was placed in air flows in the wind tunnel that simulated wind flows over the urban terrain of building heights and densities of Boston's downtown, over the suburban terrain of South Boston, and over the open water area of the Inner Harbor surrounding the project sites. The basic study model encompassed the area within a 2,400-foot radius from the center of the project sites (see Figure V.3-1). This model was mounted on the tunnel turntable and rotated to simulate wind flows from various compass directions. However, the basic study model included only a few of the tall downtown buildings at the edge of the waterfront within the 2,400-foot radius. The basic study model did not encompass large-scale, existing buildings or buildings now under construction near the downtown waterfront upstream of westerly wind flows that affect the wind environment of Fan Pier and Pier 4. A special detachable section of the model was constructed that included most of the 25 to 40 story buildings in Boston's downtown area, including existing buildings and several under construction, such as Rowes Wharf, International Place, and Marketplace Center (see Figure V.3-1). This section of the model was employed to improve test accuracy in the simulation of winds from westerly directions over the downtown.

In the wind erosion test, a single, particle-thick layer of ricelike particles was placed on all pedestrian areas and open spaces in the model. The test wind speed was then increased from 0 to 15 mph, and then to 40 mph in 5 mph increments. At each speed increment, the adjusted distribution of particles was recorded photographically. This procedure was repeated for each of the three alternatives for winds originating from each of the sixteen compass directions. Due to the proximity of the project sites to the dense terrain of Boston's downtown to the west and south, and the wide open area of the Inner Harbor waterfront to the northeast, two approach wind flows, called "boundary layers," were used in the tunnel. The first boundary layer, designed to simulate flows over suburban areas, was used for winds coming over the city from the SE, SSE, S, SW, WSW, W, WNW, and NW. The detachable section of the model containing the high-rise buildings of Boston's downtown converted the suburban flow to an urban flow for winds coming over the city from these directions. The second boundary layer,

FIGURE V.3-1
Wind Erosion Study Model



designed to simulate flows from across the water, was used for winds from the NNW, N, NNE, NE, ENE, E, and ESE.

A more detailed description of the wind erosion test methodology and data analysis will be contained in the Wind Analysis Appendix, which will be released in January, 1986, after completion of the December testing and analysis of the Pier 4 Lesser-Scale Alternative.

■ Data Analysis

To compare ground-level wind conditions for each of the alternatives at specific locations on the project sites, data for 31 stations shown in Figure V.3-2 was compiled from the photographs taken during the wind erosion test. Examples of these photographs, for the Initial Master Plan Proposals, are shown in Figure V.3-3; the complete set of photographic data will be presented in the Wind Analysis Appendix. The velocities at which the particles were first eroded from each of the 31 stations, for each of 12 wind directions (N, NNW, NW, WNW, W, WSW, SW, SSW, S, SE, E, NE, and N), were recorded for existing conditions (No-Build), the Initial Proposals, and the Lesser-Scale Alternatives. These velocities were weighted with a statistical description of the Boston wind climate that was determined from wind velocity direction and magnitude data collected over a twenty year period at Logan Airport (see Figure V.3-4) to predict an approximate equivalent average velocity that will be exceeded one percent of the time at each station, for each of the three alternatives studied, as shown in Table V.3-1. Using these procedures, the qualitative, photographic data from the wind erosion test was used to approximate estimated 100-hour return period equivalent average velocities to within ± 3 - 4 mph.

Comfort Criteria

In order to evaluate the pedestrian-level effects of wind velocities, the predicted equivalent average velocities obtained from the wind tunnel analyses were compared to comfort criteria. In the wind erosion anlaysis of the Fan Pier and Pier 4 Development master plans, estimated wind velocity data was evaluated according to an international standard that has been used by WBWT for the past six years, the Melbourne Criteria. As shown in Figure V.3-5, many authors have attempted to define criteria to evaluate and categorize pedestrian-level winds. All of these criteria are subjective, defined by qualitative human comfort levels correlated with characteristic wind velocities, usually measured in terms of the hourly average wind velocity. The graph in Figure V.3-5 compares hourly average wind speeds with the probability of exceeding those average speeds. This graph is further scaled using a variety of comfort criteria detailed in the accompanying legend.

FIGURE V.3-2
31 Stations Tested for Existing Conditions

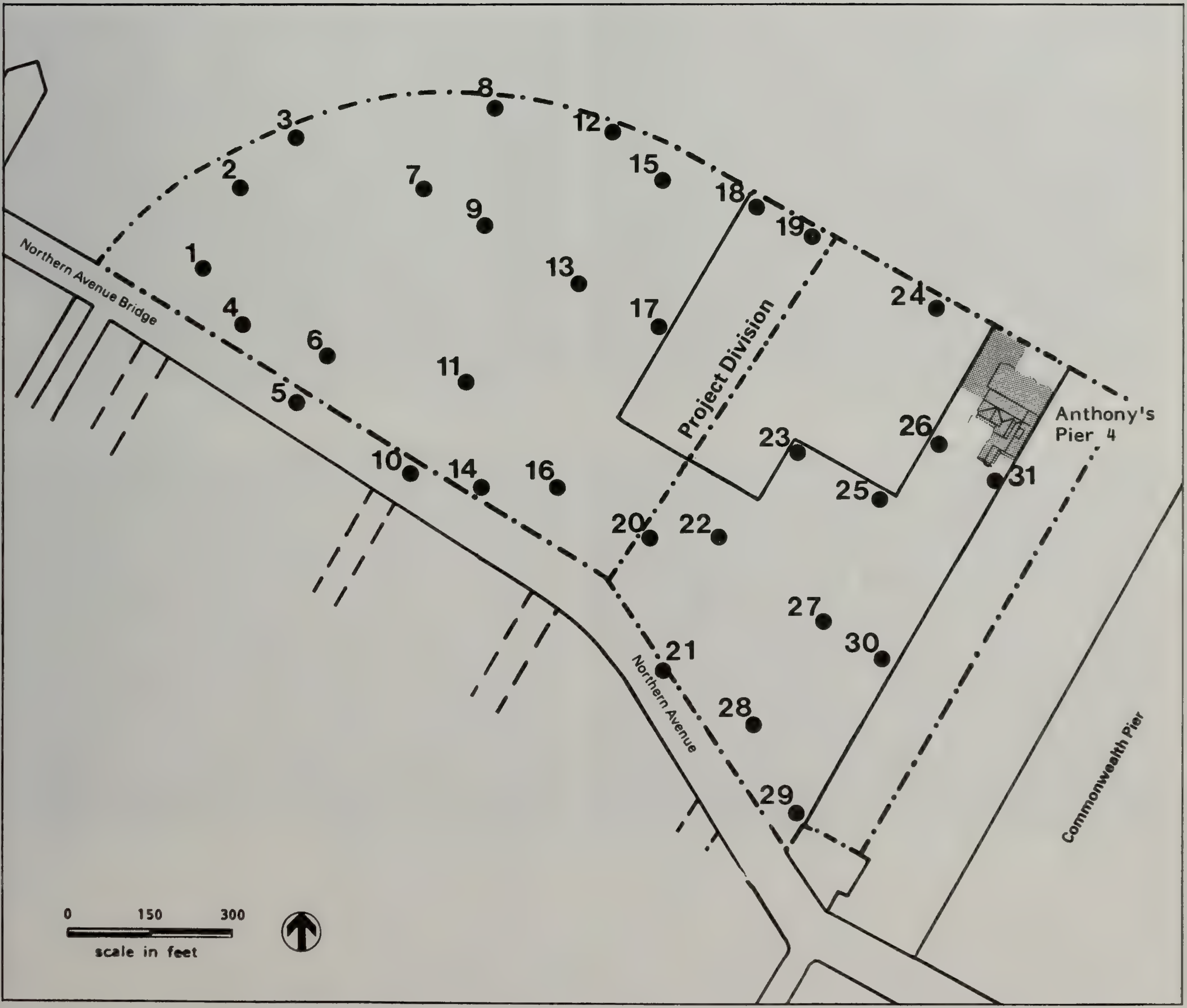
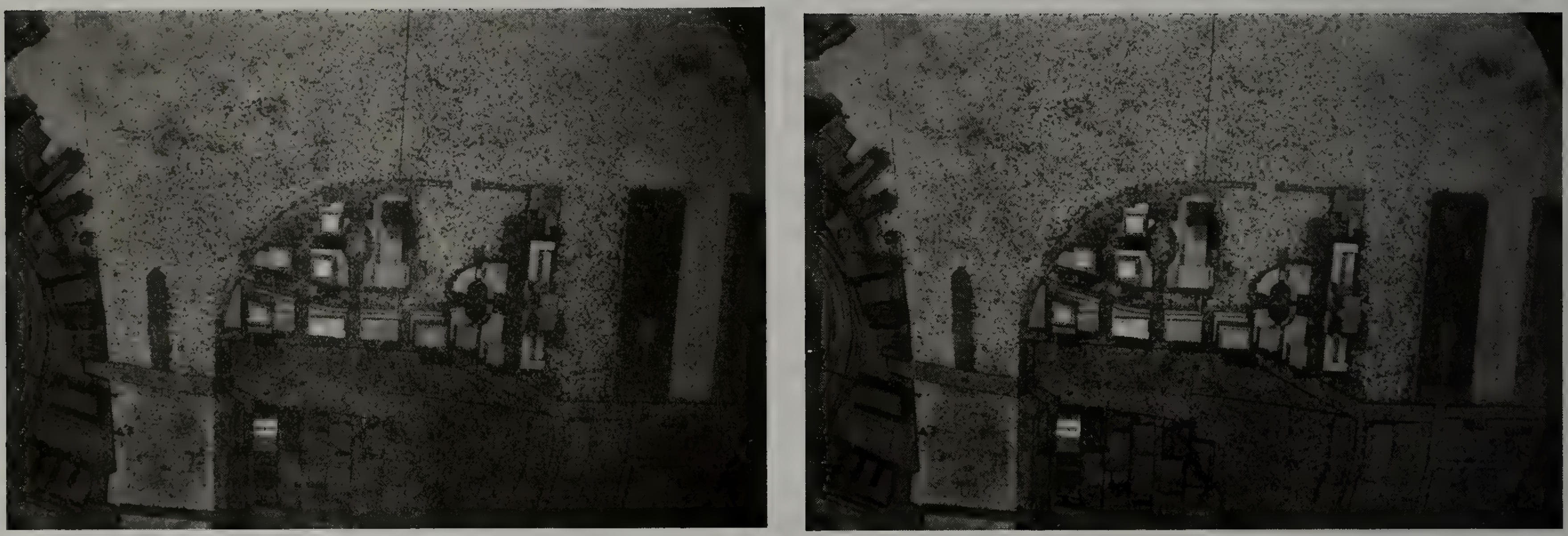
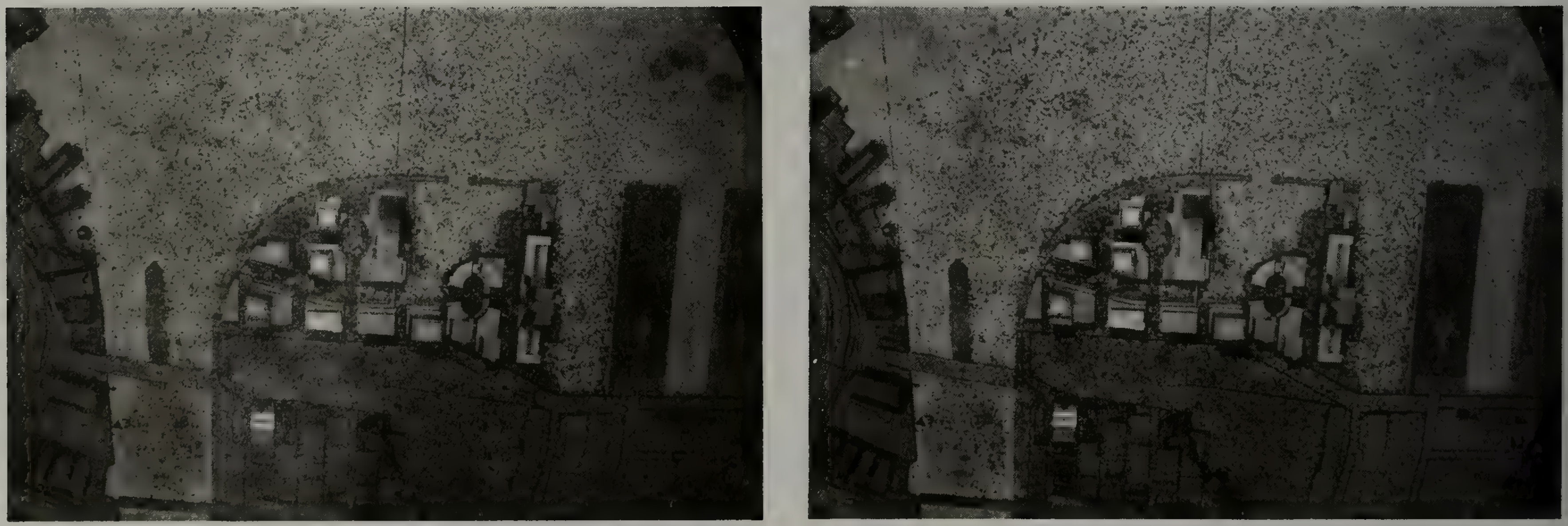


FIGURE V.3-3
Wind Erosion, WNW
Fan Pier Development and
Pier 4 Development
Initial Master Plan
Proposals



0 mph

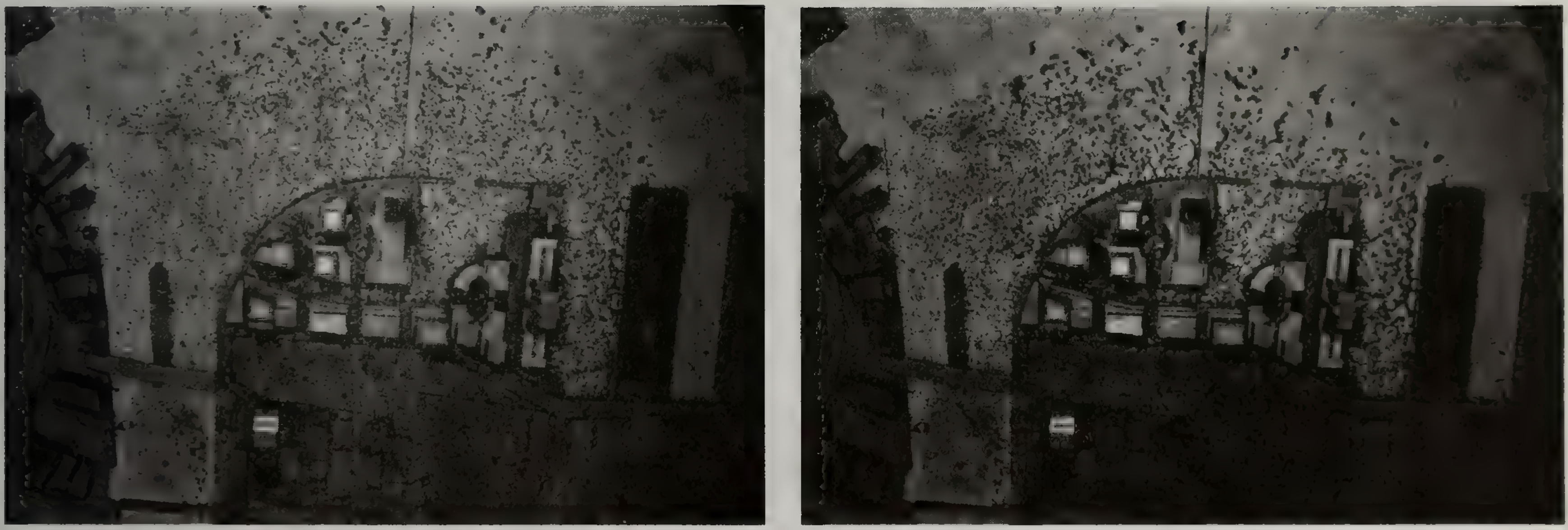
15 mph



20 mph

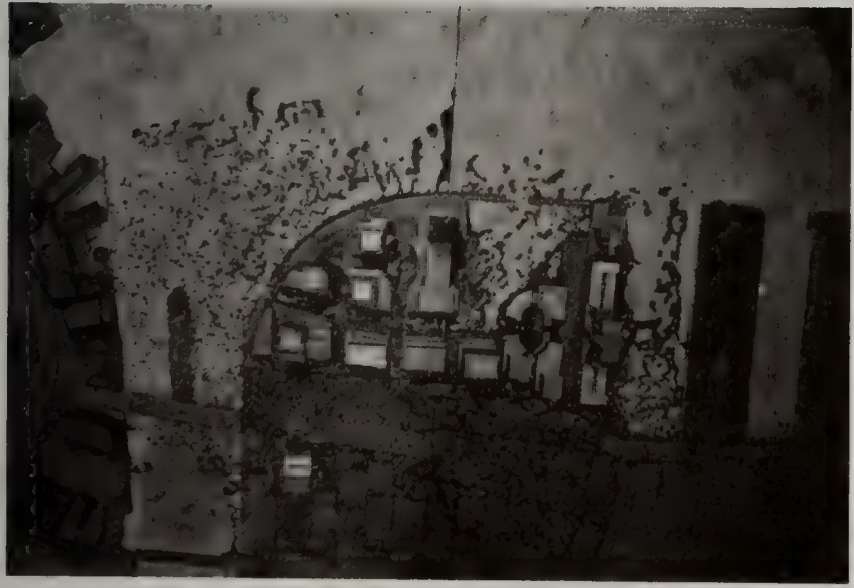
25 mph

FIGURE V.3-3
(Continued)
Wind Erosion, WNW
Fan Pier Development and
Pier 4 Development
Initial Master Plan
Proposals



30 mph

35 mph



40 mph

TABLE V.3-1
Predicted 100-Hour Return Period Equivalent Average Velocities and Melbourne's Criteria

		No-Build		Initial Proposal		Lesser-Scale Alternative	
Project	Station	Velocity (mph)	Melbourne Category	Velocity (mph)	Melbourne Category	Velocity (mph)	Melbourne Category
Fan Pier	1	13	4	15	3	15	3
	2	12	4	21	2	23	2
	3	13	4	17	3	16	3
	4	12	4	15	3	14	4
	5	12	4	15	3	16	3
	6	12	4	16	3	17	3
	7	12	4	14	4	13	4
	8	12	4	15	3	17	3
	9	12	4	15	3	16	3
	10	12	4	16	3	17	3
	11	12	4	18	3	18	3
	12	12	4	16	3	14	4
	13	13	4	12	4	14	4
	14	12	4	16	3	13	4
	15	12	4	18	3	17	3
	16	12	4	19	2	18	3
	17	13	4	13	3	16	3
	18	15	3	20	2	20	2
	19	13	4	20	2	17	3
Pier 4	20	14	4	20	2	-	-
	21	13	4	13	4	-	-
	22	12	4	15	3	-	-
	23	15	3	19	2	-	-
	24	13	4	18	3	-	-
	25	13	4	15	3	-	-
	26	14	4	17	3	-	-
	27	13	4	17	3	-	-
	28	13	4	15	3	-	-
	29	13	4	16	3	-	-
	30	14	4	18	3	-	-
	31	13	4	17	3	-	-

FIGURE V.3-4
Boston Wind Rose

Boston annual wind rose. Surface data obtained from Logan Airport 1945-1965.

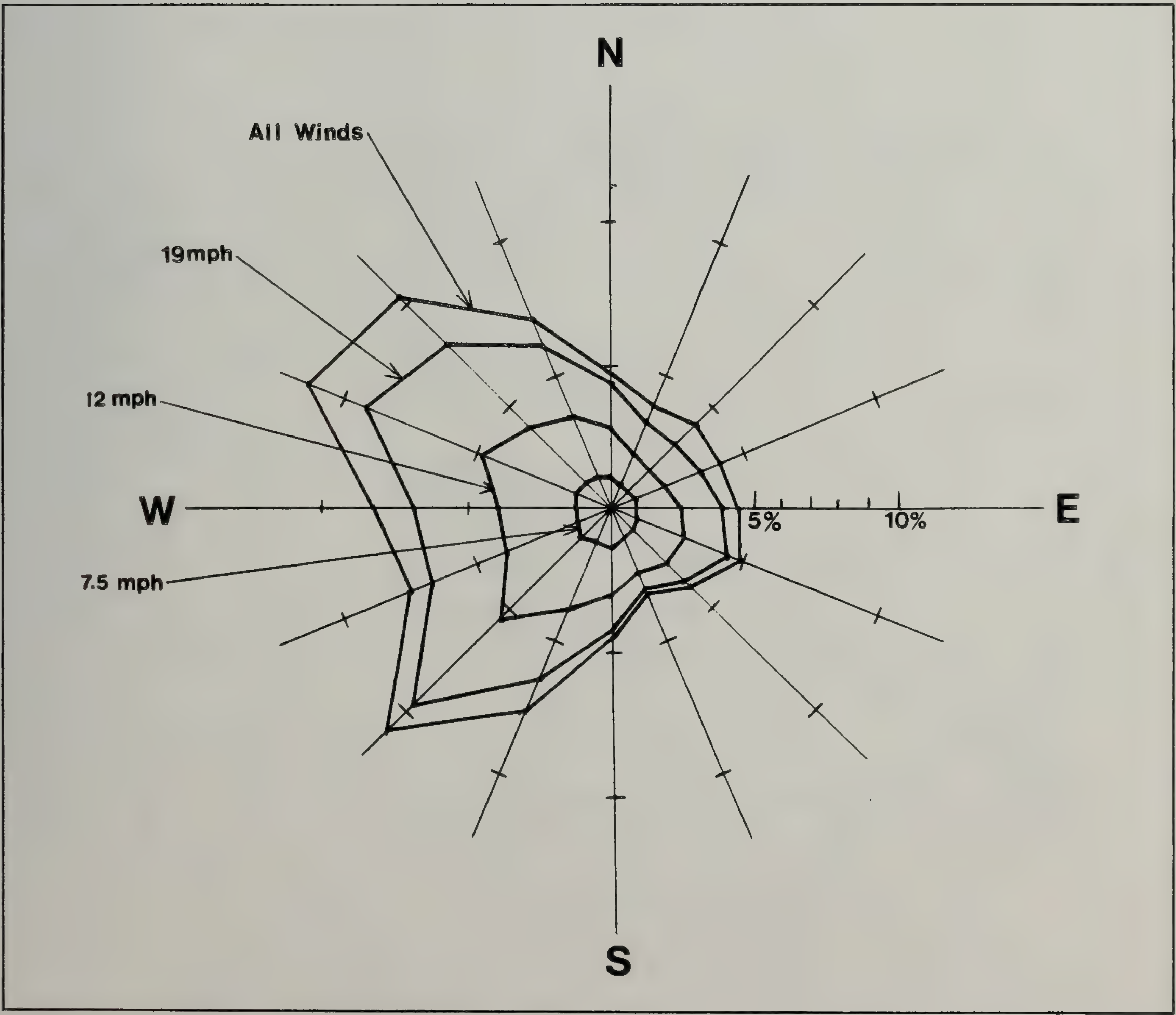


FIGURE V.3-5
Melbourne's Criteria for Average Hourly Pedestrian-Level Winds Compared with Other References

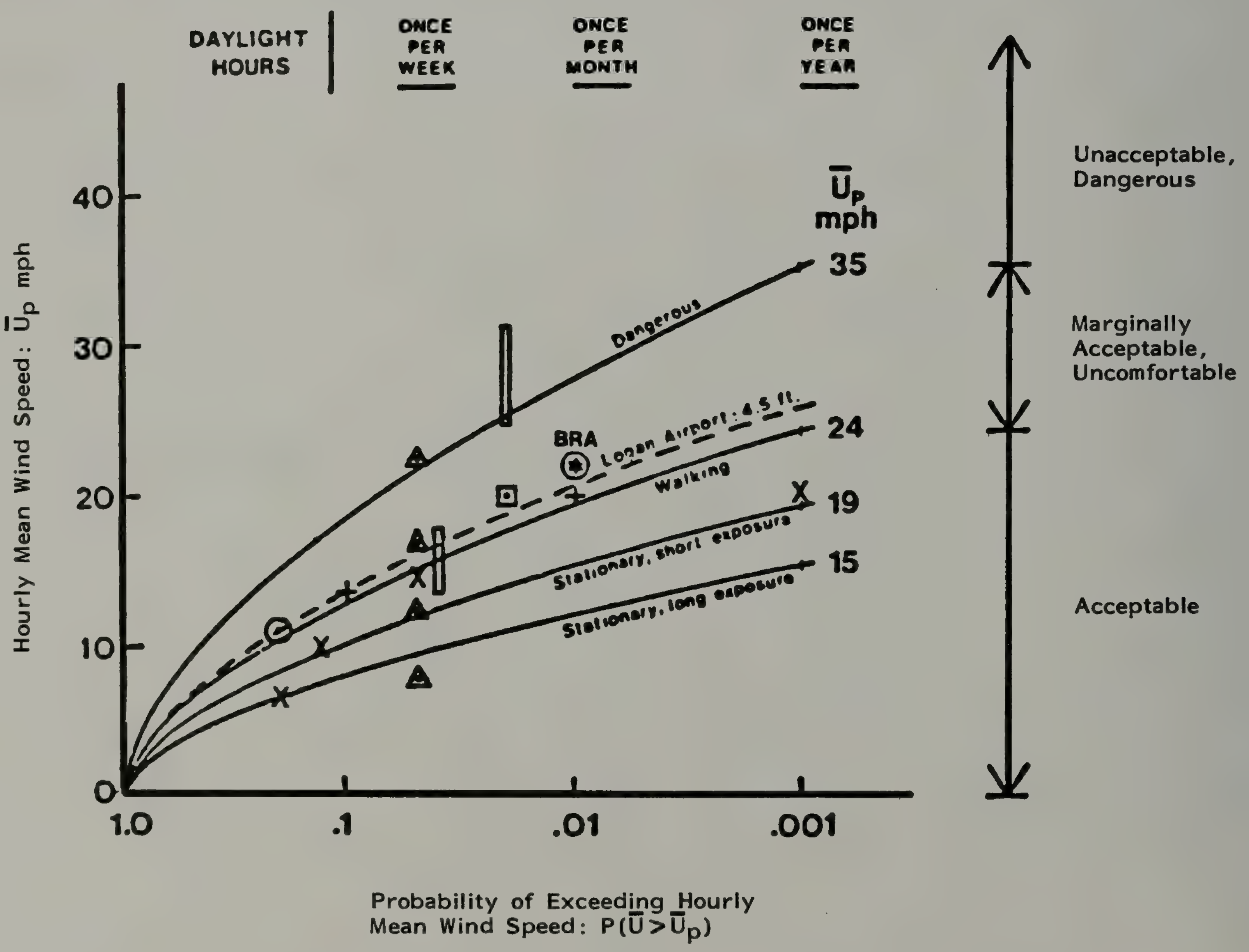


FIGURE V.3-5 (Continued) Melbourne's Criteria for Average Hourly Pedestrian-Level Winds Compared with Other References

		SYMBOL
Conditions at Logan Airport		- - -
Criteria		
MELBOURNE [15]		—
DAVENPORT [5]		
Acceptable for:		
Walking fast	If $P[\bar{u} > 22.4] < 0.05$	△
Strolling	If $P[\bar{u} > 16.8] < 0.05$	△
Standing, Sitting Short Exposure	If $P[\bar{u} > 12.3] < 0.05$	△
Standing, Sitting Long Exposure	If $P[\bar{u} > 7.8] < 0.05$	△
PENWARDEN and WIDE [19]		
Acceptable	If $P[\bar{u} > 11.2] < 0.2$	⊙
LAWSON [14]		
Acceptable	If $P[\bar{u} > 13.4 \text{ to } 17.8] < 0.04$	═
Unacceptable	If $P[\bar{u} > 24.6 \text{ to } 31.3] < 0.02$	═
HUNT, POULTON and MUMFORD [13]		
Acceptable for Strolling	If $P[\bar{u} > 13.4] < 0.1$	+
Acceptable for Walking	If $P[\bar{u} > 20.1] < 0.01$	+
RADOVSKY and DURGIN [21]		
Acceptable	If $P[\bar{u} > 20.1] < 0.02$	⊡
COHEN et al		
Unacceptable - limit for safety	If $P[\bar{u} > 20] < 0.001$	X
Acceptable for:		
Walking	If $P[\bar{u} > 14] < 0.05$	X
Strolling (short exposure)	If $P[\bar{u} > 8] < 0.10$	X
Sitting (long exposure)	If $P[\bar{u} > 5] < 0.20$	X
BRA Guideline*	$P[\bar{u} > 22] < 0.01$	◉

*Converted to average hourly winds.
ALL velocities in mph.

Melbourne's Criteria. The set of criteria applied to the wind velocity data in this study was developed by W. H. Melbourne. Based upon a literature review of past studies and other wind comfort criteria, in 1978 Melbourne developed a probabalistic criteria for hourly average pedestrian-level wind speeds defined by safety considerations and different types of human activity accommodated by each level of wind speed. Melbourne established five levels of human comfort criteria: "unacceptable and dangerous," "uncomfortable for walking," "acceptable for walking," "acceptable for short periods of standing or sitting," and "acceptable for long periods of standing or sitting." Melbourne's categories can be used to assign to each criteria level a characteristic range of hourly average pedestrian-level wind speeds with a one percent probability of occurrence, as shown in Table V.3-2:

TABLE V.3-2

MELBOURNE'S CRITERIA FOR 100-HOUR RETURN PERIOD

CATEGORY		WIND VELOCITIES (U)
	Comfort Criteria	Hourly Average (Uav) (MPH)
1	Unacceptable and dangerous	$27 \leq Uav$
2	Uncomfortable for walking	$19 \leq Uav < 27$
3	Acceptable for walking	$15 \leq Uav < 19$
4	Acceptable for short periods of standing or sitting	$12 \leq Uav < 15$
5	Acceptable for long periods of standing or sitting	$Uav < 12$

DESCRIPTION OF THE ENVIRONMENT

The wind climate data used in the analysis of the wind erosion test data was based upon the data from Logan Airport. During 68 percent of the year, the wind comes from the westerly directions. In the summer, the prevailing winds are from the southwest, while in the winter, they come from the northwest. In the fall and spring, the wind directions are transitional.

The Fan Pier and Pier 4 project sites are very exposed--surrounded by the open water area of the Inner Harbor to the north and northeast, and two to four blocks of vacant land area to the south and southwest.

In addition, the Fort Point Channel separates the sites from the downtown to the west and northwest. However, the Fan Pier and Pier 4 sites are shielded from westerly winds by the high-rise buildings of the city's downtown. The high-rise buildings deflect wind flows away from the ground level, while the magnitude of this deflection decreases with distance from the shielding buildings. This shielding effect protects the Fan Pier and Pier 4 sites from the strongest winds experienced in Boston, which come from the northwest.

For existing (No-Build) conditions, all of the stations except 18 and 23 were found to be in Melbourne's category 4, "comfortable for short periods of standing," as shown in Table V.3-1. The estimated equivalent average velocities at stations 18 and 23 were found to meet the criteria for Melbourne's category 3, "acceptable for walking." These results indicate that under existing conditions, the Fan Pier and Pier 4 project sites experience relatively mild ground-level wind conditions. The median annual equivalent average velocity for the 31 stations evaluated was 12.4 mph, while the average annual 100-hour return period equivalent average velocity measured for Boston at Logan Airport is approximately 20.5 mph. The average of the estimated velocities for the Fan Pier site was found to be approximately two mph less than the average of the estimated velocities for the Pier 4 site. This difference in estimated velocities between the two sites is probably due to Pier 4's location slightly further from the downtown and its greater exposure to SW winds.

PROBABLE PROJECT IMPACTS

Addition of buildings to the Fan Pier and Pier 4 sites will serve to increase velocities in and around the project sites. The introduction of the mid and highrise building masses of the Fan Pier and Pier 4 Developments into the wind flow pattern will redirect winds down the building faces toward the ground level. The data evaluated from the wind erosion test indicates that with the Fan Pier and Pier 4 Developments in place, ground wind velocities will increase compared to existing conditions. Stations at each development (see Figures V.3-6 and V.3-7) showed an average increase in predicted 100-hour return period equivalent average velocities of approximately 4 mph, as compared to existing (No-Build) conditions. However, most of the stations will experience wind velocities in Melbourne's category 3, "comfortable for walking."

FIGURE V.3-6
31 Stations Tested for
Initial Master Plan
Proposals

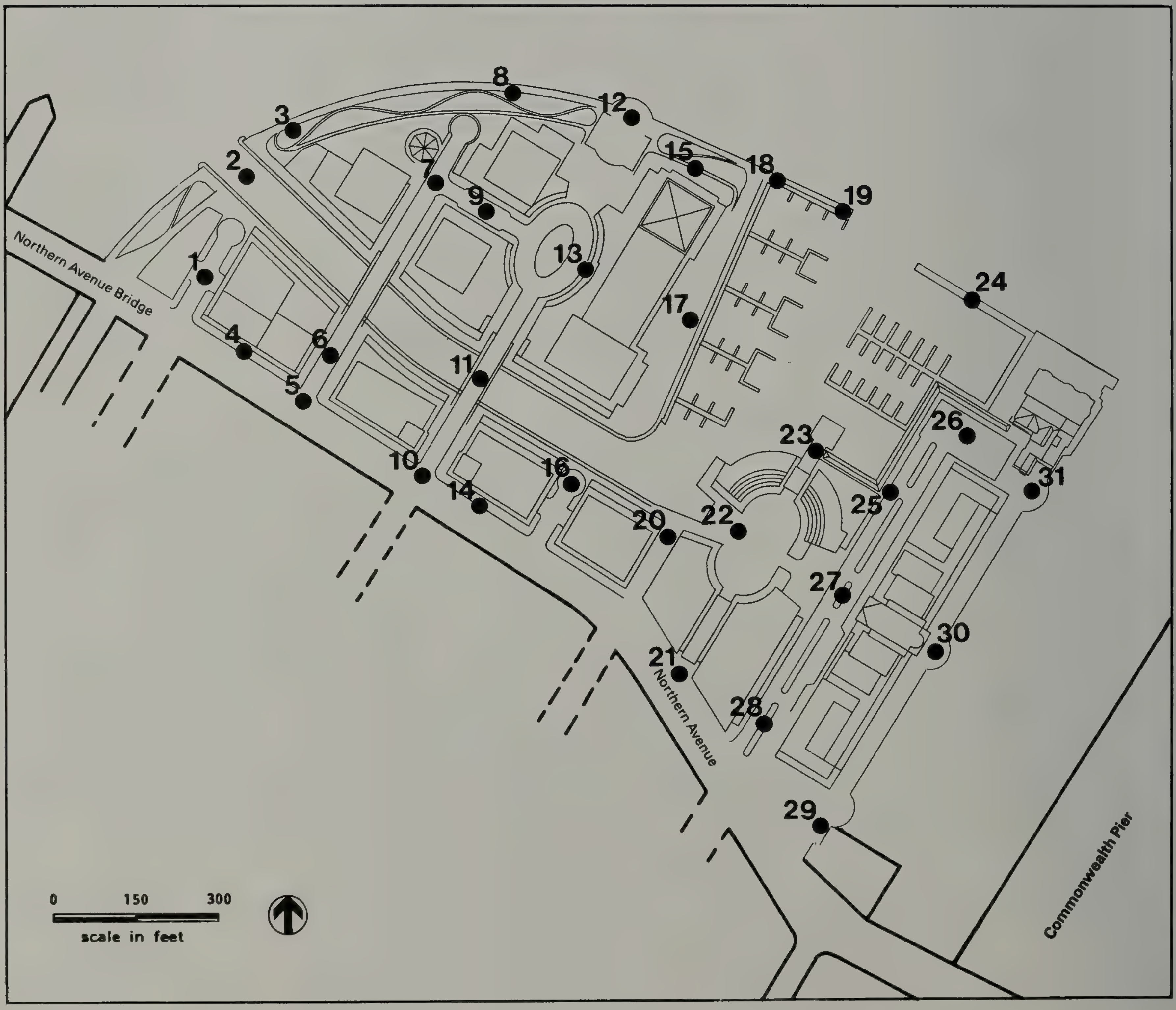
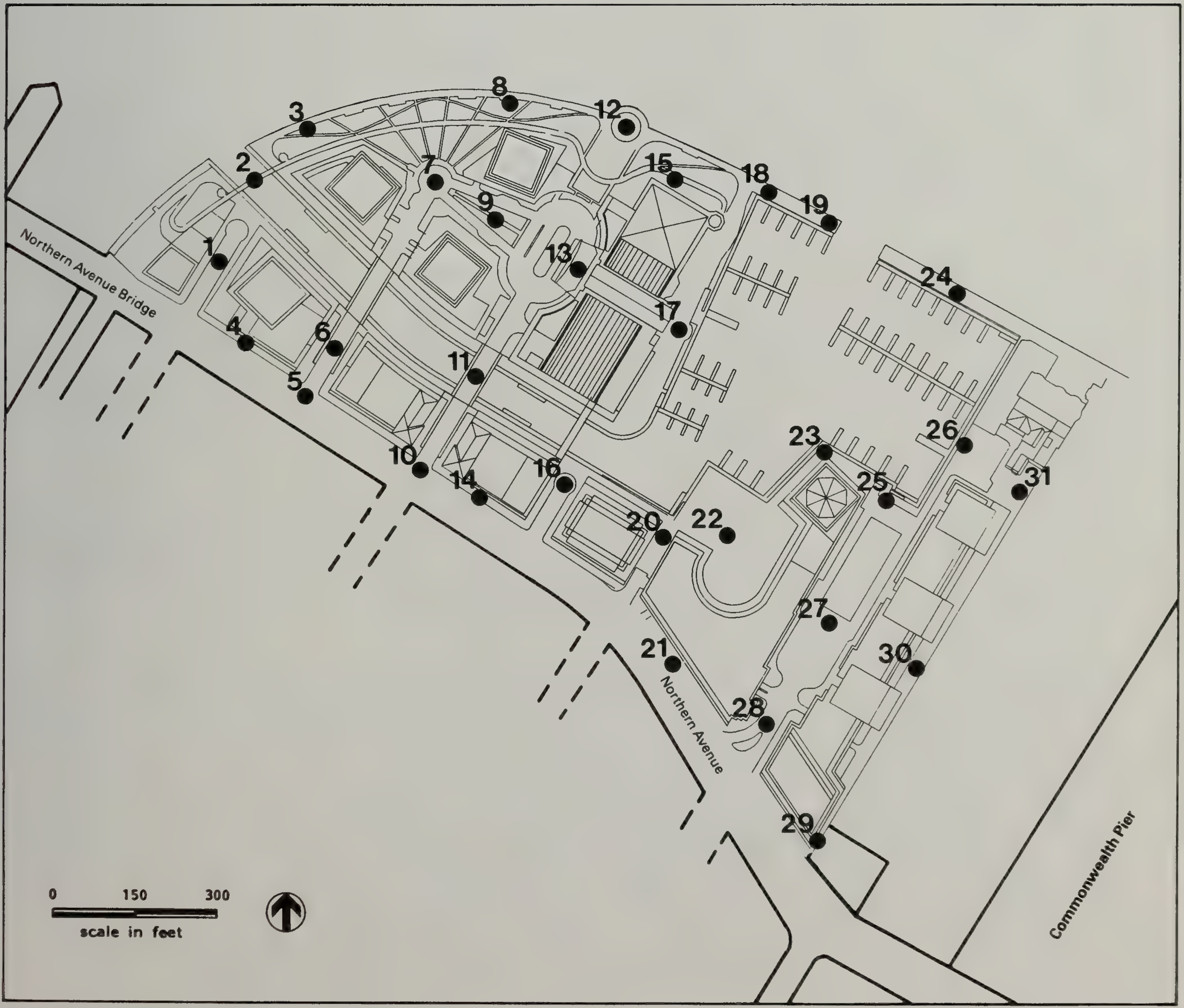


FIGURE V.3-7
31 Stations Tested for
Lesser-Scale Alternative

Note:

An early version of the Pier 4 Lesser-Scale Alternative was tested. Additional testing of the recent Pier 4 Lesser-Scale Alternative (shown in the right-hand side of the plan below) will occur in December, 1985.



Fan Pier Development

Based on the analysis of the data obtained during the wind erosion test, the Initial Master Plan Proposal and the Lesser-Scale Alternative for the Fan Pier Development were found to increase winds in and around the project site, each causing approximately the same effects on the ground wind environment.

Initial Proposal. Most stations experienced predicted wind velocities in Melbourne's category 3, "comfortable for walking." However, four stations (2, 16, 18, and 19) experienced conditions in Melbourne's category 2, "uncomfortable for walking." Three of these four stations (2, 18, and 19) are along the water's edge. Station 2 is located at the end of the new canal near Fort Point Channel. Stations 18 and 19 are located on the breakwater extending out from Fan Pier at the entrance to the marina. Both of the stations are on top of the breakwater, where wind flows are relatively unobstructed by the building masses of the proposed developments, and where these stations are exposed to winds of a higher velocity due to the elevation above the water. Station 16, which also experiences conditions in Melbourne's category 2, "uncomfortable for walking," is located at the end of the roadway marking the project division line between the two developments.

The stations in the waterfront park along the curved edge of the Fan Pier experienced moderate velocities in Melbourne's category 3, "comfortable for walking." A significant percentage of the winds affecting the stations along the water's edge come from the north and northeast, and usually occur during storms involving precipitation when these outdoor areas would not be heavily used.

Although other public open space areas on the Fan Pier Development experienced increased velocities as compared to existing conditions, the stations evaluated in these areas remained within comfortable categories according to Melbourne's criteria.

Lesser-Scale Alternative. With the Lesser-Scale Alternative, the 19 stations studied for the Fan Pier Development experienced wind conditions similar to those observed for the Initial Proposal. Only two stations (2 and 18) experienced conditions in Melbourne's category 2. Due to the qualitative nature of the wind erosion test and the approximation method used to predict equivalent average wind velocities from the photographic data, velocities observed for the Lesser-Scale Alternative were not significantly different from those observed for the Initial Proposal. The average of the equivalent average velocities did not change in the Lesser-Scale Alternative as compared to the Initial

Proposal for the Fan Pier Development Master Plan. Therefore, based on the data obtained from the wind erosion test, the Initial Master Plan Proposal and Lesser-Scale Alternative for the Fan Pier Development are predicted to result in similar ground wind environments in and around the project site.

Pier 4 Development

The effects on the ground wind environment in and around the Pier 4 site due to development of the Initial Master Plan Proposal were found to be similar to those observed for the Fan Pier Development. In addition, the Lesser-Scale Alternative for the Pier 4 Development-- which has not been tested yet--is anticipated to result in a ground wind environment similar to that observed for the Initial Proposal.

Initial Proposal. The majority of the 12 stations evaluated for the Pier 4 site experienced wind conditions in Melbourne's category 3, "comfortable for walking," with the Initial Proposal in place. Only one station (21) was found to be in Melbourne's category 2, "uncomfortable for walking." This station, located toward the end of Pier 4 between Anthony's Pier 4 Restaurant and the hotel building (see Figure V.3-6), experienced greater winds than it did when tested for existing conditions.

Two stations (20 and 23) experienced improved wind conditions compared to existing conditions. Both of these stations experienced predicted velocities within Melbourne's category 4, "acceptable for short periods of standing." Stations 20 and 23 are recessed from the harbor edge toward the interior portion of the marina. The stations evaluated in the other public open space areas of the Pier 4 Development, including the common and the Pier 4 Harborwalk, were all found to experience comfortable wind conditions in Melbourne's category 3.

Lesser-Scale Alternative. Although the Lesser-Scale Alternative of the Pier 4 Development Master Plan has not been tested yet, its effects on the ground wind environment in and around the project site can be estimated from the available data. Due to the similarities in the overall massing configurations of the Initial Master Plan Proposal and the Lesser-Scale Alternative as described in Chapter III, the effects on the ground wind environment due to the Lesser-Scale Alternative in and around the project site are expected to be very similar. The wind erosion analysis of the Lesser-Scale Alternative for the Pier 4 Development Master Plan is scheduled for completion in December, 1985. The results of this analysis will be presented in the Final EIR.

MITIGATION MEASURES

Although wind velocities in and around the project sites will be increased with the proposed Fan Pier and Pier 4 Developments, overall wind conditions will remain comfortable according to Melbourne's criteria. However, certain mitigation measures can be incorporated into the master plan designs to help improve adverse wind conditions in and around the project sites. Extensive tree plantings will help reduce winds in public open spaces, particularly along Harborwalk and other pedestrian ways. In addition, adverse wind conditions in the particularly exposed areas near the Fan Pier breakwater and Anthony's Pier 4 Restaurant could be mitigated through the use of protective covered walkways.

The proponents are committed to continued study, and mitigation, of possible impacts to the ground wind environment resulting from the Fan Pier and Pier 4 Developments as the master plans progress. The qualitative wind erosion study--to be completed in December, 1985--will be followed by more detailed quantitative analyses, including the evaluation of possible mitigation measures, when the projects advance beyond the master plan stage into schematic design.

Urban Design Issues

Tidelands and Public Purpose

INTRODUCTION

Ordinarily, development activity in tidal flats and in waters of the Commonwealth are regulated by the Waterways Division of the Department of Environmental Quality Engineering (DEQE). This authority, contained in Chapter 91 of the Massachusetts General Laws, is designed to preserve and protect certain rights usually retained by the public in these areas. Because the Fan Pier and Pier 4 Master Plans are proposed for development on filled tidal flats and in the waters of the Commonwealth, the Secretary of Environmental Affairs requested that the proponents discuss the history of the sites in order to assess the extent of the jurisdiction of DEQE under Chapter 91. The following section demonstrates that because of the unique legislative and title history of these sites, the jurisdiction of DEQE is quite limited but that the proponents have designed their master plans to satisfy the DEQE criteria that would otherwise have applied.

TITLE BACKGROUND

Early maps of the city of Boston indicate that dry land in this portion of South Boston existed only as far as Dover Street around the present location of the Dover Street Bridge. From these "uplands" northward toward what is now Fan Pier and Pier 4, there existed a vast expanse of tidal marshlands. These "tidal flats" were subject to the ebb and flow of the tides and thus were periodically submerged and periodically exposed.

Because these and other similar areas in Massachusetts Bay Colony were used by the public for such activities as fishing, fowling, and navigation, the Colony Ordinances of 1647 set forth the different rights of the upland owners and the public to use these areas. From the uplands, ownership of the underlying land was specified as belonging to the upland owners so far as the "tide doth ebb and flow" or 100 rods (1,650 feet) from mean high water, whichever should occur first. There was reserved to the public in these areas, however, the right to fish, fowl and navigate provided that the public did not trespass on private property in order to enjoy these rights.

The tidal flats beyond 100 rods remained the property of the Commonwealth and could be disposed of by the Legislature at its discretion. The land subject to the Fan Pier and Pier 4 Master Plans is upon such tidal flats.

HISTORY OF FILLING

■ During Public Ownership

During the 1800's, the uplands, the tidelands owned by the upland owners, and the tidal flats owned by the Commonwealth had been developed for commercial purposes mostly by the Boston Wharf Company along Sleeper, Farnsworth, and Pittsburgh Streets, to midway between Congress Street and what was to become Northern Avenue. The Commonwealth, speaking through various legislative reports and acts, sought to encourage the development of the remaining tidal flats to support deep water piers, and warehouse and transportation facilities. Agreements were entered into with various private parties to fill the flats, construct piers and wharves and develop warehouses and transportation facilities. The activity, however, was sporadic and halting and evidence exists which shows that the Commonwealth's purpose was frustrated by various private parties running out of funds despite assistance from the Legislature thorugh the issuance of public bonds to finance the activity.

By 1870, filling had commenced pursuant to Chapters 432, 450, and 461 of the Acts of 1869. However, by 1871, the Commonwealth was forced to repossess large portions of Fan Pier because of the failure of the private parties to carry out the filling activity as instructed by the Legislature.

In 1873, a four party indenture between the Commonwealth (acting by its Board of Harbor Commissioners which was given authority in this area by Chapter 236 of the Acts of 1872 and which supervised additional filling authorized by Chapter 320 of the Acts of 1872), the Boston & Albany Railroad Company, the Boston Wharf Company and the City of Boston was executed in order to resolve disputes relating to ownership, to set forth the plan for filling, and to call for the layout out of Northern Avenue and the contruction of the Northern Avenue Bridge when the filling was completed. License No. 229 was issued in the following year to authorize additional portions of this work.

However, it was only by 1878 that filling was completed and wharves constructed on a major portion of the Fan Piers. Thereupon, the Commonwealth leased that portion of the Fan Piers which had been filled to the New York and New England Railroad. In 1880, Chapter 260 provided the necessary enabling legislation for the railroad and additional filling was authorized by License No. 555 but disputes developed again over the progress of additional filling and construction. These resulted in the Commonwealth suing the Boston & Albany Railroad and terminating its rights to use the property. The Commonwealth therefore assigned to the New York & New England Railroad both the rights of the Boston & Albany and additional rights to continue this activity in a larger parcel which included the balance of the Fan Piers and also Pier 4. Additional delays and disputes regarding this portion of the work were resolved in an agreement between the Commonwealth and the New York & New England Railroad in 1882.

By 1888, much of the work had been completed and the Legislature granted additional filling rights to the New York & New England Railroad in Chapter 301 of the Acts of that year.

■ Transfer to Private Ownership

Finally, by 1889, the filling and construction required by the Commonwealth had been completed and a 25-acre and a 50-acre parcel were conveyed by warranty deeds by the Commonwealth to the New York & New England Railroad. These parcels, which included the current Fan Pier and Pier 4 sites, were constituted of both the filled land and additional submerged lands. The parcel deeds, presented in the Tidelands Appendix, are very significant because they mark a departure from the previous filling and development process in which the Commonwealth participated as a fee owner and now began a process in which the Commonwealth only participated in a regulatory mode.

The deeds were significant in many other respects. First, the deeds conveyed all of the Commonwealth's rights of ownership in the parcels. The deeds specifically did not reserve to the people of the Commonwealth any rights in the waters over these lands. Second, there were no conditions imposed upon the grantee to use the property for any particular purpose. In this respect, these deeds are significantly different from the rights granted to other private parties to build piers or wharves (such as the owners of Lewis Wharf) which would obstruct the public's rights to fish, fowl and navigate. Those rights, granted by special legislation were explicitly or impliedly conditioned upon subsequent use of the property for mercantile or wharving purposes. Third, the deeds were for significant consideration, $1.1 million, and thus indicate that the Commonwealth was currently and adequately compensated for divestiture of all of its rights. Earlier legislative grants for wharving rights (such as for Lewis Wharf) were without consideration. Fourth, the deeds were warranty deeds. That is, the Commonwealth as grantor warranted to the grantee that "it is lawfully seized in fee simple of the granted premises and that they are free from all encumbrances except as aforesaid [referring to a reservation to lay out Northern Avenue and install certain sewer lines], and that it has good right to sell and convey the same as aforesaid and that it will warrant and defend the same to the said grantee and its successors and assigns forever against the lawful claims and demands of all persons excepting as aforesaid . . ." Thus, the Commonwealth asserted that it was the holder of all of the rights held by anyone to use, occupy or develop any portion of land conveyed, that it was conveying all of those rights, and that it would defend all subsequent owners against attempts by any persons to assert such rights.

Thus, it can be concluded from this history, summarized graphically in Figure V.4-1, and specifically from these deeds that neither the Commonwealth, nor any private party nor any member of the public has retained any rights in the 75 acres conveyed by these deeds which include all of the Fan Pier and Pier 4 Master Plan sites; therefore, the application of Chapter 91 to the development sites is inappropriate. The proponents, however, notwithstanding this conclusion, have devised master plans that meet all the criteria established by Chapter 91, not only those of a regulatory nature, but those based on reserved rights of the public in tidelands, even though in this case there were no rights reserved either expressly or by implication.

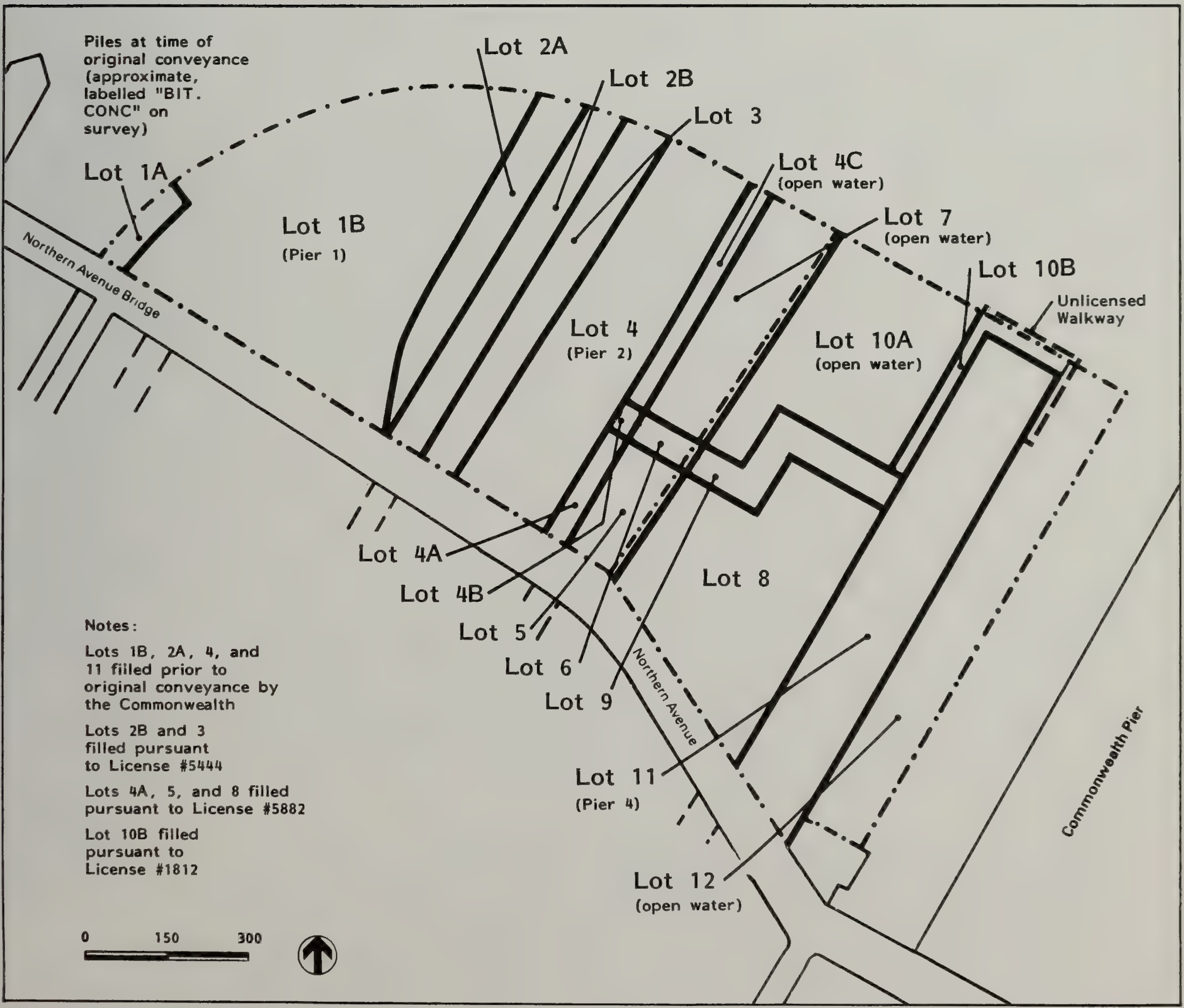
■ Recent Private Filling Activities

Following the conveyance by the Commonwealth by warranty deed in 1889, additional portions of Fan Pier and Pier 4 have been filled. These activities were done pursuant to License No. 1812, dated July 24, 1895, License No. 2712, dated February 3, 1903, License No. 167, dated January 10, 1916, License No. 647, dated April 12, 1926, License No. 1681, dated June 11, 1935, License No. 4888, dated November 25, 1964, License No. 5554, dated May 28, 1969, and License No. 5882, dated April 21, 1971. See Tidelands Appendix.

All of the legislative and administrative licenses were made irrevocable pursuant to Chapter 743 of the Acts of 1965, Chapter 411 of the Acts of 1967 and Chapter 754 of the Acts of 1979. See Tidelands Appendix.

At some point during the early 1970's apparently at the same time that work was being done pursuant to License No. 5882, a small amount of the Pier 4 development site

FIGURE V.4-1
Fill and License History of Fan Pier and Pier 4


Piles at time of original conveyance (approximate, labelled "BIT. CONC" on survey)
Lot 1A
Lot 1B
(Pier 1)
Lot 2A
Lot 2B
Lot 3
Lot 4C
(open water)
Lot 7
(open water)
Lot 10B
Unlicensed Walkway
Lot 4
(Pier 2)
Lot 10A
(open water)
Northern Avenue Bridge
Lot 4A
Lot 4B
Lot 5
Lot 6
Lot 9
Lot 8
Northern Avenue
Lot 11
(Pier 4)
Lot 12
(open water)
Commonwealth Pier
Notes:
Lots 1B, 2A, 4, and 11 filled prior to original conveyance by the Commonwealth
Lots 2B and 3 filled pursuant to License #5444
Lots 4A, 5, and 8 filled pursuant to License #5882
Lot 10B filled pursuant to License #1812
0
150
300

(shown as Lots 4B, 6, and 9 in Figure V.4-1) was also filled without the benefit of a specific license. Also, because of the lack of detail and precision of many of the licenses, it is likely that minor portions of Pier 4 (including a walkway on the east, some protective piles on the north, and excess filled land from an abutter on the east) may not have been included in existing licenses. The proponents of the Pier 4 Master Plan expect to make validation of this work part of their Chapter 91 application to be filed with the Department of Environmental Quality Engineering.

This history is shown graphically on Figure V.4-1.

In addition, all new work for minor extensions of the seawall and the installation of new supporting piles and piles for the breakwater, marina and navigational aids, will be the subject of applications for new licenses by the project proponents.

HISTORY OF MARITIME ACTIVITY

Following the filling activities of Fan Pier and Pier 4 in the latter half of the eighteenth century, the sites became the location of a South Boston cargo terminal. In 1895, the New York, New Haven, and Hartford Railroad took over the operations of the New York and New England Railroad Company and over the next twenty years developed the piers as a railroad freight and shipping terminal. Initially coal--moved by train over land and by coastal colliers at sea--was the principle cargo handled at the sites. After 1914, both the Merchant and Miner's Transportation Company and the Boston and Philadelphia Line used portions of the Fan Pier. Between 1930 and 1960, the use of the piers for shipping and railroad operations began to decline, and other businesses, such as trucking companies, began to occupy the sites along with the railroads and shipping agent companies. In the early 1960's, Anthony's Pier 4, Inc., and Pier 4, Inc., acquired the property from the New York, New Haven and Hartford Railroad Company, and all rail operations ceased. Since 1960, maritime use of the sites has been minimal. For a brief period in 1984, lobsterboats operated from a portion of the Fan Pier. The existing excursion boat company located on the western edge of Fan Pier began its tenancy-at-will in 1981.

V.5

Urban Design Issues
Public Access

INTRODUCTION

The purpose of this section is to describe existing public access to the Fan Pier and Pier 4 sites and the benefits to public access that will accrue from development of the Initial Master Plans or Lesser-Scale Alternatives. Where applicable, amenities that encourage public access in the proposed master plans are compared with public plans and policies pertaining to public access on the waterfront. By dedicating approximately 50 percent of each site to public open space, the new master plans reinforce city and state policies to provide upgraded, safe landside access to the waterfront, allowing the public to take advantage of these coastal tideland areas. Maritime uses of the site are examined in Chapter V.6, Water-Related Activities.

DESCRIPTION OF THE ENVIRONMENT

- Fan Pier

Most of the Fan Pier site and its waterfront are inaccessible to the public. Fan Pier is used primarily as a parking lot for weekday commuters. Although Fan Pier has 2,130 linear feet of waterfront, little of this length is accessible to the public. The only direct access to the water from the site is provided at the docking area of the excursion boat operation located on the western side of the Fan Pier near the mouth of the Fort Point Channel.

- Pier 4

Pier 4 has 2,750 feet of waterfront, but public access is limited to views of the harbor enjoyed by patrons of Anthony's Pier 4 Restaurant. Attached to the restaurant is a small fish market. The remainder of the site is occupied by an at-grade parking lot that serves the restaurant.

PROBABLE PROJECT IMPACTS

- No-Build Alternative

Under this alternative, public access to the sites would continue to be limited to the parking, restaurant, and excursion boat uses presently occupying the Fan Pier and Pier 4 sites. Access to the harbor would be limited to patrons of the excursion boat on Fan Pier and Anthony's Pier 4 Restaurant.

- Initial Proposals

Despite the prominent location of Fan Pier and Pier 4 on Boston's Inner Harbor, the current land uses on the sites severely limit public access to the waterfront. Reactions to the original ENF Master Plan for the two sites emphasized the need for greater concentration on public accessibility in the planning for Fan Pier and Pier 4. A major goal in the rethinking of the master plans for each development was to better facilitate public access throughout the sites. The Initial Master Plans for both the Fan Pier and Pier 4 Developments established a framework to encourage public access to the sites and the waterfront. Approximately 50 percent of the total site area for each development will be publicly accessible under the Initial Proposals. Included among the major public features for both projects are extensions of the city's Harborpark/ Harborwalk along Boston's waterfront, public walkways, open spaces, and enclosed facilities ancillary to the maritime uses discussed in Chapter V.6, Water-Related Activities. Figure V.5-1 identifies the locations of the major public areas incorporated into the Initial Proposal for each project.

Fan Pier Initial Master Plan

Approximately 50 percent of the Fan Pier Development site area will be publicly accessible with the Initial Proposal. With parking underground, the ground level of the development will be oriented toward pedestrian use. The master plan contains close to 8/10 of a mile of varied pedestrian walkways, including the Fan Pier Harborwalk, marina boardwalk, and canal promenades. An examination of the Initial Proposal's public features and their contribution to the use and enjoyment of the waterfront follows.

Harborwalk. The perimeter of the Fan Pier Development site will serve as an integral part of Harborwalk, and will be designed according to the Harborpark guidelines. This segment of Harborwalk will provide approximately 2,000 linear feet of walkway along the harbor's edge, complemented by an additional 2,000 linear feet of promenades along the canal's edge. The Fan Pier Harborwalk route will encompass the perimeter of the Fan Pier, segments of the canal promenade, the Farnsworth and Pittsburgh Street bridges, and related public amenities (see Figure V.5-1). These amenities will include a public waterfront park, amphitheater, a marina boardwalk, and passenger boat landing.

The Fan Pier Harborwalk will maintain a minimum width of 15 feet, and will be accessible to handicapped users for the entire length. Because the ground elevation north of the canal--except at the water's edge--is proposed to be 10 feet higher than the portion of the site south of the canal, the walkway along the waterfront park will have two tiers, one close to the water's edge and the other serpentine, furnishing views of downtown Boston and the Inner Harbor. The design of the walkways will incorporate such public amenities as benches, landscaping, interpretive signage, lighting, railings, bulkhead safety ladders, and areas to provide views of downtown and the harbor. Materials to be used for the walkway will follow the standards established by the city's Harborpark guidelines. For safety, the walkway will be capable of supporting emergency and maintenance vehicles.

Open Spaces. The Initial Master Plan proposes three public open spaces: (1) a public waterfront park along the Fan Pier's curved perimeter, (2) a landscaped plaza in the center of the site, and (3) an amphitheatre adjacent to the center plaza. The public waterfront park, set aside from the more urban canal, will provide a natural environment in which pedestrians can view the activities in the harbor. Located in the center of the site, the one-acre urban plaza will also serve as the terminus to Pittsburgh Street. Vehicles dropping off and picking up passengers at the hotel entry will loop around the plaza, which also contains a landscaped area from which the harbor can be seen. The urban plaza will open out to an amphitheatre cantileverd over the harbor's edge. This open area will provide a place where pedestrians can sit and observe harbor life, and where public events can be staged.

Canal Promenades and Retail Arcades. The edges of the 90-foot wide canal running east to west across the site will introduce additional water frontage to the Fan Pier. Both sides of the canal will be dedicated exclusively to pedestrian use activated by 15-foot-wide walkways and arcades lined with retail and restaurant uses. The canal will be aligned with the Custom House Tower in downtown Boston, commanding views of this historic landmark from most of the length of the canal promenades. Incorporating an active retail presence along the canal promenades in the Fan Pier Development Initial Master Plan Proposal will encourage consumers, window shoppers, and strollers on the site.

Walkways. In addition to the Fan Pier Harborwalk and canal promenades, the Fan Pier Initial Proposal will provide pedestrian walkways along the site's street system and between all buildings and public facilities. The streets and adjacent sidewalks will lie perpendicular to the water's edge to frame and focus views out to the harbor. The bridges crossing the canal serve as public viewing platforms to help further focus views out toward the water and also perpendicularly down the canal, across the channel to the downtown and Custom House Tower, and toward the marina and Pier 4 public open space plaza.

Docks and Breakwaters. All of the maritime activities described in Chapter V.6, Water-Related Activities, will be easily accessible from the landside. Floating quays along both sides of the canal will be accessible at certain points to pedestrians and the handicapped; however, for public safety and the security of boat owners, much of the quay will not be open to the general pedestrian public. All the seawalls will be decked for safe public access. The eastern side of the Fan Pier seawall will also provide access for boats to the marina docks and slips. The breakwater extending from the northeastern corner of the site at the mouth of the marina will be constructed to accommodate pedestrians and will also serve as another public viewing platform of the harbor.

Enclosed Public Facilities. In addition to outdoor public spaces, the Fan Pier Development Initial Proposal will also provide indoor facilities for public use. A pavilion in the park will furnish enclosed space for public gatherings. Arcades will offer shelter along the canal retail promenades, facilitating year-round access. A restaurant at the top of the hotel will furnish patrons with panoramic views of the harbor and city. The passenger boat landing, water shuttle dock, and marina will be complemented by appropriate landside facilities, as described in the section on Water-Related Activities.

Pier 4 Initial Master Plan

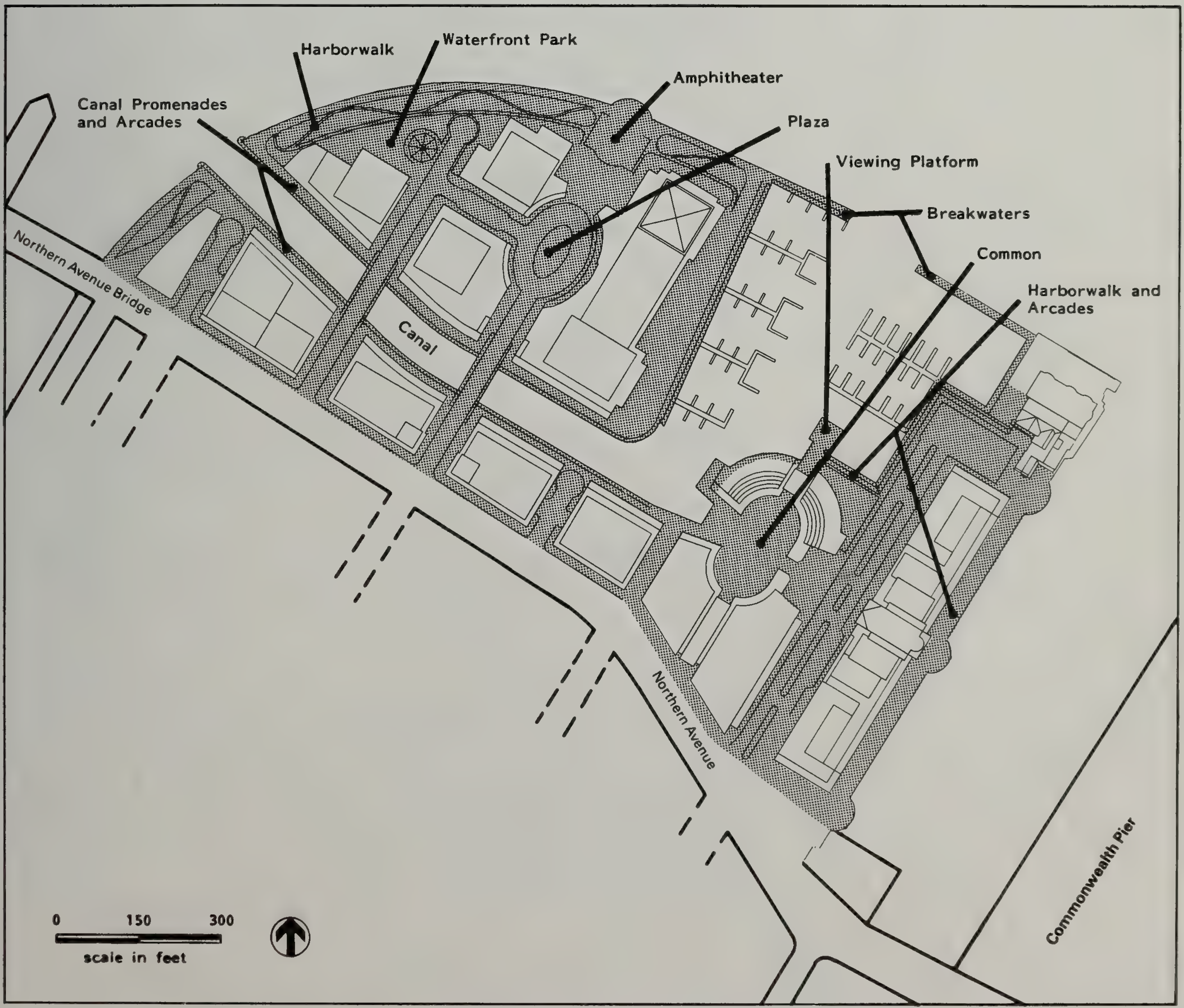
The Pier 4 Initial Proposal will dedicate approximately 50 percent of the site area to public access. The water's edge will be treated as an exclusively pedestrian area, limiting vehicular travel to a single roadway in the center of the site with all parking facilities located underground. Following is a description of the public areas included in the Pier 4 Initial Proposal Master Plan (see Figure V.5-1).

Harborwalk. The 2,000 linear-foot walkway along the water's edge at Pier 4 will represent the furthest southern extension of the city's current Harborwalk plan. The Pier 4 portion of Harborwalk will extend from the end of the Fan Pier Harborwalk on the south side of the canal, around the edge of the Pier 4 public plaza

FIGURE V.5-1
Public Open Space
Initial Proposals

Legend

▨ Public Open Space



and along the western edge of the marina. At Anthony's Pier 4 Restaurant, the Pier 4 Harborwalk will be diverted in front of the restaurant because there is not enough width on the pier behind the restaurant to accommodate the walkway. On the eastern side of the site, the walkway returns to the water's edge, overlooking Commonwealth Pier 5 and affording additional views of the harbor. Segments of the Pier 4 Harborwalk will be protected by covered walkways and arcades.

In keeping with the city's Harborpark/Harborwalk guidelines, the Pier 4 Harborwalk will be 15-feet wide and fully accessible to pedestrians and handicapped users. Like the Fan Pier Harborwalk, the Pier 4 Harborwalk design will incorporate such public amenities as benches, landscaping, interpretive signage, lighting, railings, bulkhead safety ladders, and viewing areas to provide views of downtown and the harbor. Materials to be used for the walkway will follow the standards set by the Harborpark guidelines. To accommodate safety considerations, the Pier 4 Harborwalk will be capable of supporting emergency and maintenance vehicles.

Open Spaces. The Initial Proposal Master Plan includes an oval plaza at the head of the marina adjacent to the Fan Pier canal. The plaza shape will be defined by buildings on the four corners, and by entrances from Northern Avenue, the site roadway, and a major entrance looking out onto the Fan Pier canal. A fourth entrance will lead into the plaza from the Pier 4 Harborwalk viewing platform overlooking the marina. This plaza will be planned as a site for public events and outdoor exhibits relating to the piers' history.

Walkways. Walkways will be provided along both sides of the center roadway and across the roadway from the hotel through to the public plaza, and around the plaza perimeter to the western side of the site.

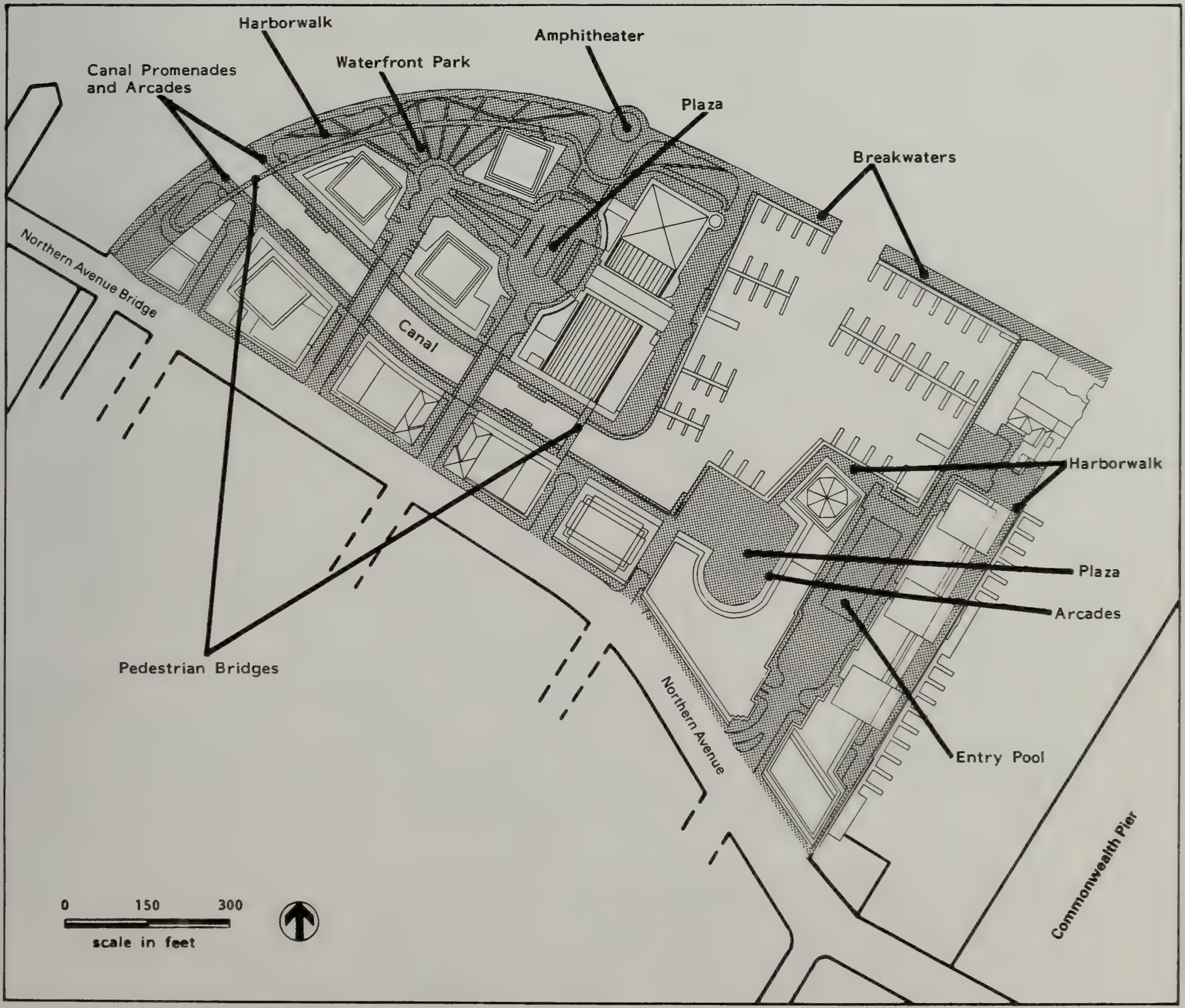
Docks and Breakwaters. The marina docks and slips, and the breakwater, discussed in Chapter V.6, Water-Related Activities, will be safely and easily accessible to pedestrian and handicapped users.

Enclosed Public Facilities. Arcades will surround the public plaza and continue along stretches of the Pier 4 Harborwalk, providing pedestrians refuge from inclement weather. The marina will have ancillary landside support facilities, discussed in more detail in the next section of the chapter on Water-Related Activities. Anthony's Pier 4 Restaurant will continue to offer patrons views of the harbor from its location at the end of the pier.

FIGURE V.5-2
Public Open Space
Lesser-Scale Alternatives

Legend

▨ Public Open Space



■ Lesser-Scale Alternatives

State and local agencies and interested groups that reviewed the Initial Proposals for both projects suggested improvements to the public access plans. The resulting modifications and improvements to the basic public access programs are reflected in the Fan Pier and Pier 4 Lesser-Scale Alternatives. Figure V.5-2 highlights the public features included in the Lesser-Scale Alternatives for each project.

Fan Pier Lesser-Scale Alternative

With changes to the Initial Master Plan, the area of the Fan Pier devoted to public access will increase from approximately 50 percent of the site area in the Initial Proposal to approximately 60 percent of the site area in the Lesser-Scale Alternative. The following descriptions of the public areas that will be included in the Lesser-Scale Alternative examines both new public features and alterations to the public areas that were included in the Initial Proposals.

Harborwalk. To cross the Fan Pier canal in the Initial Proposal, the Fan Pier Harborwalk would be diverted along the canal promenades to the vehicular/pedestrian bridges and then back out to the harbor and marina. Reviewers of the Initial Proposal suggested crossings at the pier's perimeter to make the Harborwalk continuous along the water's edge. The Lesser-Scale Alternative will include two bridges exclusively for pedestrian use, one at each end of the canal. The bridge at the Fort Point Channel end of the site will be served by an elevator ramp that provides handicapped access across the bridge and along the Fan Pier Harborwalk.

Open Spaces. The Lesser-Scale Alternative will introduce another public open space feature to the Fan Pier Master Plan: a triangular, "city square"-like park linking the plaza at the terminus of Pittsburgh Street to the east, and the entrance to the waterfront park at the terminus of Farnsworth Street to the west. This landscaped park will be designed to reflect the character of Boston's traditional, small urban squares.

Canal Promenades. After analysis by the architect and marine experts, the width of the canal will be reduced from 90 feet to 83 feet to provide additional width needed to grow trees and increase pedestrian circulation along the northern promenade. Proposed water-related activities will not be affected by this minor change in canal width.

Walkways. Walkways have been introduced in the waterfront park that will radiate from the center out toward the water's edge. These walkways will operate like ribs of a fan to help better define and accentuate the curved shape of the pier. In addition, to complement the canal view west to the Custom House Tower, a strong eastward view will be established from the entrance to the waterfront park at the terminus of Farnsworth Street, through the center plaza, to a glassed portion of the hotel that extends to the marina.

Pier 4 Lesser-Scale Alternative

The new master plan for the Pier 4 Lesser-Scale Alternative will retain the general program for landside public access introduced in the Initial Proposal, while further opening up the major public spaces to views of the water and refining the character of each of the three major public spaces: the plaza at the end of the Fan Pier canal, the entry court, and the Pier 4 Harborwalk. In addition, the Lesser-Scale Alternative will enlarge the space devoted to the public, despite the reduction in area of the site that was proposed to be added as fill and new decking in the Initial Proposal. The descriptions of the Lesser-Scale Alternative public areas pertain only to the changes from the Pier 4 Initial Proposal program for public access.

Open Spaces. One objective in redesigning the Pier 4 Master Plan was to remove the buildings at the head of the marina, which blocked views from the public plaza out over the marina and beyond to the harbor. The newly designed plaza area will remain essentially in the same location, but will create new views opening out to the marina and Fan Pier canal. Activated by arcades lined with retail uses at the ground floors of the building that defines its south and east edges, this plaza will provide an obvious destination for pedestrians walking along the Fan Pier canal toward the Pier 4 site. A major pedestrian entrance from Northern Avenue will lead into a shopping rotunda and then out into the public plaza. Halfway down the site's roadway in the central court will be a long, rectangular pool that will extend the sense of water into the site's interior.

Enclosed Public Facilities. The Pier 4 Lesser-Scale Alternative will incorporate a variety of commercial boat landings, and where appropriate, covered and enclosed landside support space. These maritime uses are discussed in more detail in Chapter V.6, Water-related Activities. Interpretive displays featuring the history of Boston's waterfront will also be introduced on the site.

■ Surrounding Areas

Public access plans for each alternative have considered known plans for surrounding public facilities. The city is studying opportunities to preserve and re-use portions of the old Northern Avenue Bridge, which is eligible for listing in the National Register of

Historic Places. Any plans to make the bridge a public attraction such as a museum or the Harborwalk link between downtown and the Fort Point Channel, will be compatible with the plans for public areas proposed for the southwestern portion of the Fan Pier site. Public areas on the Fan Pier site would also complement park plans that have been studied by the Chamber of Commerce for a piece of city waterfront property located south of Northern Avenue across from Fan Pier. At Pier 4 the walkways and boating docks along the eastern edge of the pier will provide an active, publicly accessible counterpoint to the public apron on Commonwealth Pier 5.

■ Conclusion

Safe public access will be increased from almost none today to approximately one half of each site with both the Fan Pier and Pier 4 Initial Proposals. The Lesser-Scale Alternative for each project will further increase the area allocated to public use, improve pedestrian circulation, and enhance views of the harbor and marina. The various public spaces proposed for each project range from urban retail arcades to more natural, outdoor settings that will allow leisurely viewing of Boston's Inner Harbor, while helping to meet city and state objectives to open up the waterfront to the public, and insure its future vitality.

MITIGATION MEASURES

As the master plans evolve, the proponents will continue to review public access plans with the Boston Redevelopment Authority, the Civic Advisory Committee, the Harborpark Advisory Committee, the State Interagency Coordinating Committee, and other groups who have expressed interest in expanding public access along the waterfront. The plans for such areas as the Fan Pier and Pier 4 Harborwalks will be guided by city standards and criteria to provide the highest quality design. Measures to mitigate any impacts to public access that might occur during the construction of the maritime and other facilities discussed in this section are addressed in Chapter VI.3, Construction.

Urban Design Issues
Water-Related Activities

INTRODUCTION

The previous section on Public Access concentrated on how the proposed master plans for the Fan Pier and Pier 4 were developed to give the public access to the project sites and water's edge and to provide views of the harbor and downtown waterfront from all proposed public areas. This section describes the proposed facilities and activities that will functionally link the land and water at the Fan Pier and Pier 4 sites, providing recreational, transportation, and educational benefits to the public.

The waterside programs proposed for both project sites have evolved throughout the master planning process, and reflect city and state goals and objectives for water-based activities in the harbor. Public goals for reawakening the harbor have included integrating compatible water-based activities with different land uses promoted along the waterfront. Initial concepts for the future of Boston's harborfront encouraged recreational boating and marinas to complement and enliven open space and future office and residential development proposed along the waterfront. This focus on marinas responded to an increasing demand from local and visiting recreational boaters for mooring space in the harbor. With the growth of the tourist industry in Massachusetts, this demand has continued. Specific requests for transient slips and areas that can accommodate boat shows and other waterside events have been incorporated in the city's Harborpark guidelines.

Further evolution of harborfront goals reflects an increased emphasis on the importance of water transportation, particularly via excursion and commuter boats. Private excursion boats currently offer recreational and educational opportunities, including whale watches, trips to the harbor islands, and evening charters to a wide sector of the public who wish to enjoy the harbor and its sights. Commuter ferries, often subsidized through the state, provide water transportation to the South Shore and Quincy, and to the airport. Historically an important form of transportation in the city, commuter ferries are once again being looked to as an alternative mode of transportation that could help relieve downtown traffic congestion. In addition, water transportation services that link downtown harborfront areas on a continual basis are being considered. A Water Transportation Task Force sponsored by the Massachusetts Executive Office of Transportation and Construction has brought together public agency representatives, boat operators, developers, and other interests to discuss the integration of water transportation into public and private development. This Task Force has met on a biweekly basis for the past three years.

Recognizing the importance of integrating waterside development with landside development in the early phases of master planning, the developers retained a marine expert with extensive experience in designing, developing, and operating recreational and commercial maritime facilities as well as in building boats. To discuss appropriate water-dependent uses for the sites, the developers and their marine consultant attended special meetings of the State Interagency Coordinating Committee and met with members of the Water Transportation Task Force throughout the preliminary review period for the master plans. Other special interest groups with concerns about maritime uses in the harbor that have also been contacted include: the Harborpark Advisory Committee; the Boston Harbor Associates; the Massachusetts Association of Passenger Vessel Operators; and the designer conducting a study for the Chamber of Commerce on possible water-related uses in the Fort Point Channel. In addition, the Proponent of the Fan Pier Development has spoken with the owner of the excursion boat company presently using the site to determine their future needs. The developers are committed to continuing coordination with groups interested in the maritime activities of Boston Harbor.

These meetings and discussions, which continued after the Initial Proposals were presented, guided further improvements to the master plan designs, as reflected in the Lesser-Scale Alternatives. The water-related activities incorporated in each alternative examined in the Draft EIR are presented following a brief description of the existing environment as it relates to maritime uses of the project sites.

DESCRIPTION OF THE MARITIME ENVIRONMENT

Fan Pier and Pier 4 are located adjacent to navigable waters of Boston Harbor within the U.S. Pierhead and Bulkhead line (see Figure V.6-1). A significant amount of maritime activity occurs in the area of the harbor near the piers. The Boston Main Ship Channel through the Inner Harbor lies approximately 200 yards north of the outer edge of Pier 4. Commuter and excursion boats departing from docks at Rowes Wharf and 400 Atlantic Avenue pass the piers enroute to the South Shore. A large excursion vessel operates from a mooring adjacent to Pier 4 at the Commonwealth Pier 5 apron, which is maintained by Massport for public access.

Only 200 linear feet of the Fan Pier seawall (at the mouth of Fort Point Channel) is currently available for the safe mooring of vessels. Both Fan Pier and Pier 4 have the potential to accommodate additional maritime acitivity. However, because the water depths along most of the Fan Pier and Pier 4 are less than 20 feet at mean low tide, navigation of this area is most suited to vessels of relatively shallow drafts. Safe navigation in the proposed marina basin between Fan Pier and Pier 4 is presently impeded by two navigational hazards: the submerged remains of Pier 3, and a sunken vessel underneath the western edge of Pier 4.

The excursion boat operation at Fan Pier currently leases docking space along the pier adjacent to the Northern Avenue Bridge to moor an excursion boat and a tug boat. The excursion boat operates daily during the summer months. The 86-foot tug boat is used for office and storage space. Fueling and minor repairs occur on the site, while major repairs and painting of the vessel take place off site. The excursion boat company owns and maintains its own gangways. A small structure, which serves as a ticket office, and a small uncovered area available to passengers waiting to board the vessel, are located at the edge of the pier.

PROBABLE PROJECT IMPACTS

■ No-Build

Under the No-Build Alternative, excursion boat operation at the southwestern corner of Fan Pier--the only maritime activity on either site--would be expected to continue. Few, if any, other maritime uses could be accommodated safely at the sites without undertaking a program to stabilize deteriorating portions of the seawall, dredge for additional water depth, and provide suitable landings.

■ Initial Proposals

The Initial Master Plans concentrate on expanding recreational boating opportunities in the harbor (see Figure V.6-1) by proposing a jointly developed marina.

In addition, the excursion facilities on the Fan Pier site will also be maintained. The marina will accommodate both permanent and transient boaters and will be large enough and deep enough for special events such as in-the-water boat shows. In addition, it will be constructed to provide a place of refuge for recreational boaters and small commercial craft during storms in Boston Harbor. The specific contributions of water-related activities of the Fan Pier and Pier 4 master plans are described individually below.

Fan Pier Initial Master Plan

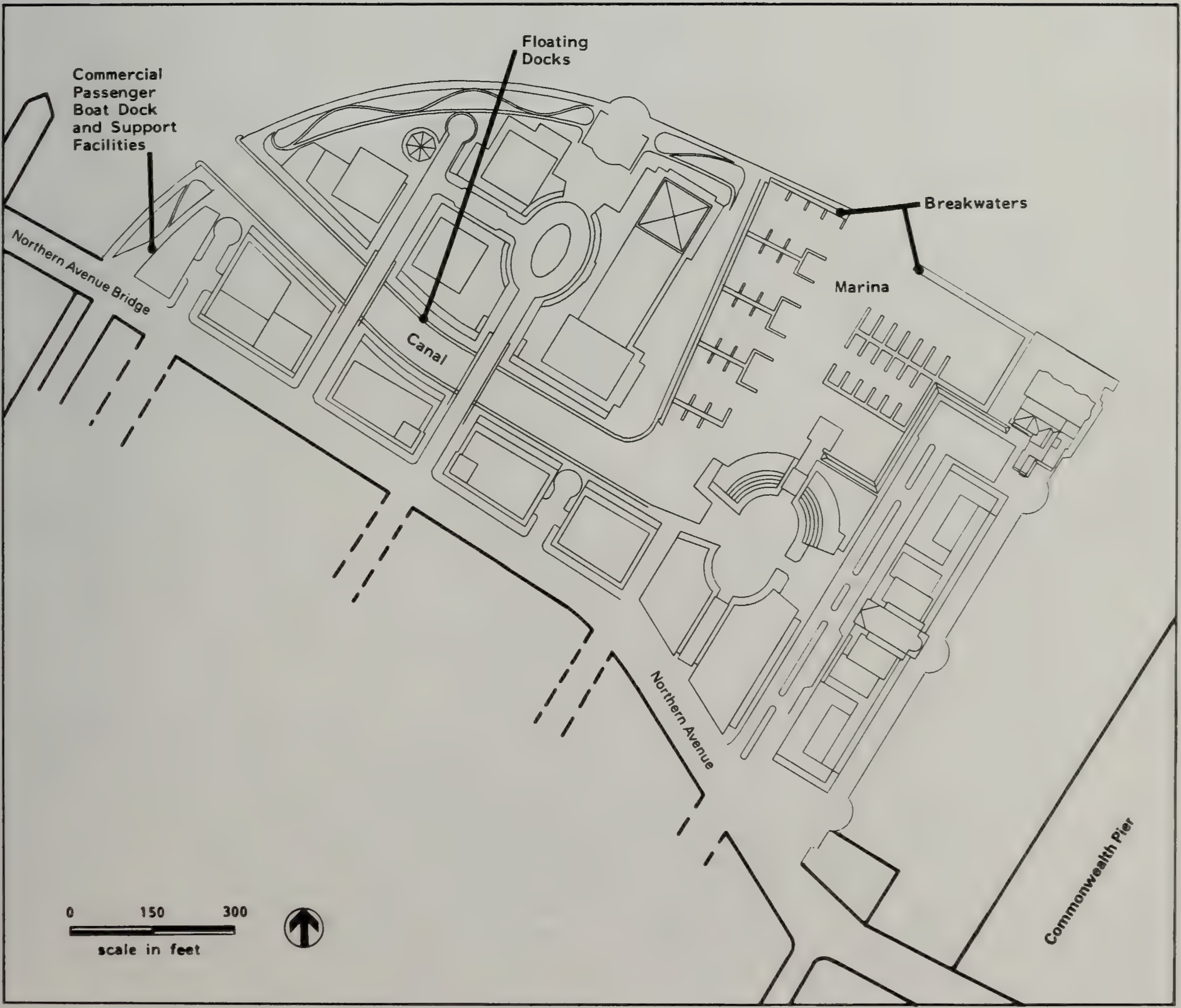
Marina. The proponent of Fan Pier is working with the proponent of Pier 4 and a marine consultant to develop the proposed marina in the inlet between the two sites. There will be approximately 80 slips on the Fan Pier property extending from the seawall east of the hotel. The floating dock system will be accessible to pedestrian and handicapped users. Landside support facilities, including administration offices, restrooms, showers, and lockers will be incorporated into buildings adjacent to the slips.

Breakwater. Running from the northeast corner of the Fan Pier will be one of two breakwaters that will mark the 100-foot wide fairway into the marina and create a protected area for boats during storms in the manner generally done by other coastal marinas of similar size. The breakwater will stand 10 feet above mean high tide and will be 30 feet wide. Breakwater construction is discussed in Chapter VI.1, Water Quality. Pedestrian access on the breakwater is described in Chapter V.5, Public Access.

Commercial Passenger Vessel Landing. Three hundred feet of dock space for commercial passenger vessels will be provided along the edge of the Fan Pier adjacent to the Fort Point Channel and the Northern Avenue Bridge, where the present excursion boat is moored. Docking space will continue to be dedicated to excursion boat operation. Docking space will also be available for additional commercial passenger boat uses.

Marine Service Facilities. As mentioned in Chapter V.5, Public Access, a marine support service facility will be located along Northern Avenue adjacent to the commercial passenger boat landing and the existing Northern Avenue Bridge. While upper floors of the building will contain general office space, the lower level will support the operations of the passenger boats. Ticketing facilities, a service area with equipment for routine maintenance of boats, restrooms, and storage space for perishable and nonperishable goods will be accommodated in the lower levels of the building. A sheltered passenger waiting area is proposed outside on the dock.

FIGURE V.6-1
Water-Related Facilities
Initial Proposals



Provisions will be made for water, electricity, trash removal, and fueling by truck. Buses with school children, the elderly, and individuals with limited mobility will be able to unload from Northern Avenue directly onto the ferryboat landing.

Fan Pier Canal. In addition to the landside canal promenades, the proposed canal itself will add additional water area for maritime use by small boats. These boats will be able to travel directly on the canal from one side of the Fan Pier site to the other or take advantage of short-term docking provided at the floating quays along both sides of the canal. The canal docking system will be accessible to handicapped users.

Pier 4 Initial Master Plan

Marina. The Pier 4 side of the proposed, jointly developed marina will contain approximately 60 slips in the Initial Proposal. As on the Fan Pier side, the floating dock system will be completely accessible to the handicapped. Landside support facilities, including administrative offices, restrooms, showers, and lockers will be incorporated into buildings adjacent to the slips.

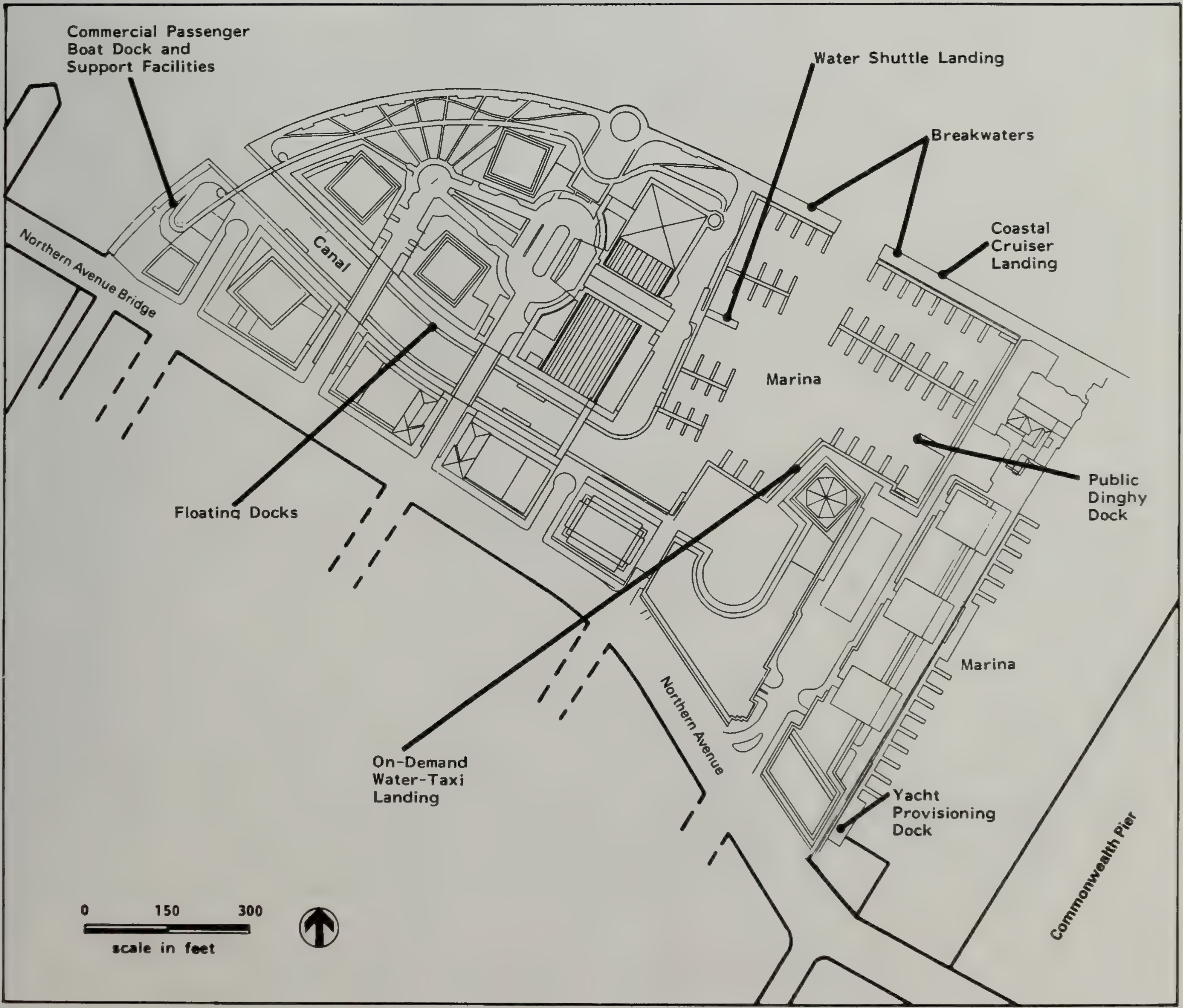
Breakwater. The Pier 4 breakwater will extend from the northwest corner of the site. Built to stand 30-feet wide and 10-feet above mean high tide, the Fan Pier and Pier 4 breakwaters will assure the marina as a place of safe refuge in the manner generally done by other coastal marinas of similar size. Breakwater construction is discussed in the Chapter VI.1, Water Quality. Pedestrian access is described in the Chapter V section on Public Access.

■ Lesser-Scale Alternatives

The ongoing meetings with public groups to help identify other appropriate water-related activities for the sites led to the expanded water transportation services included in the Lesser-Scale Alternatives. Described below are the additions to the water-based programs that are included in the Initial Proposals (see Figure V.6-2).

In a cooperative arrangement with the State Interagency Coordinating Committee, the proponent of the Fan Pier Development, in consultation with a marine consultant, is studying the feasibility of a cultural/commuter ferry that would run along the downtown waterfront making stops near landside public transportation stations, museums, and other prominent locations. Such a ferry could be implemented as a useful addition to water transportation service in Boston Harbor. If available, the results of the feasibility study will be reported in the Final EIR.

FIGURE V.6-2
Water-Related Activities
Lesser-Scale Alternatives



In addition, the proponent of the Pier 4 Development intends to run a pilot water taxi service from Anthony's Pier 4 Restaurant, to be initiated prior to construction of the first phase of the development. Evaluation of this pilot service should help the proponent to further refine plans for water transportation service at Pier 4.

Fan Pier Lesser-Scale Alternative

Airport Shuttle Landing. In July, 1985, Massport introduced an airport water shuttle service across the Inner Harbor to transport passengers to Logan Airport from two downtown waterfront stops. Massport is expected to expand its airport shuttle service to the South Boston waterfront when new development projects planned for the area are constructed. The proponent of the Fan Pier Development will provide a landing for airport shuttles in the marina basin adjacent to the hotel lobby.

Cultural/Commuter Ferry. If the feasibility study presently underway determines that a cultural/commuter ferry would be a viable service in Boston's Inner Harbor, landing dockage will be made available at the commercial passenger boat landing. The boat designs currently under consideration would clear the canal bridges at mean high tide, allowing these boats to travel through the site, possibly stopping at the quays along the canal and at the shuttle landing in the marina.

Pier 4 Lesser-Scale Alternative

Coastal Cruise Landing. A landing for coastal cruise ships will be located on the breakwater extending from Pier 4. Coastal cruise ships generally range between 200 and 250 feet in length and carry approximately 150 passengers. The industry, which is rapidly growing in this country, is seeking overnight landings that will allow their passengers easy accessibility to cultural and historical places of interest and to retail areas in prominent cities along their routes.

On-Demand Water-Taxi. An on-call water taxi service for convenient transportation service between the site and a central downtown location will be provided at Pier 4 with a landing at the base of the hotel/residential building. The proponent will sponsor a pilot program for this service--the first of its kind in the harbor--beginning in advance of the construction of Phase I. This dock and any accompanying landside facilities for the taxi could also accommodate airport shuttle and cultural/commuter ferries if introduced into the area.

Public Dinghy Dock. As requested in the Harborpark guidelines, a public dinghy dock with oar lockers will be provided at the Pier 4 side of the marina.

Yacht Provisioning Dock. Another public dock will be located at the southeast corner of the property. Here boats from the marina and elsewhere will be able to land while loading and unloading provisions and equipment from vehicles off Northern Avenue.

Marina. The Lesser-Scale Alternative, which eliminates the need for the fill and pile-supported decking proposed in the Initial Master Plan, allows an additional 90 slips, for a total of 150 slips. Some of these slips will be accommodated off the western edge of Pier 4 within the marina basin. The remaining slips are proposed to complement the residential units along the eastern edge of the pier. A minimum of 10 percent of the slips will be available to transient boaters.

■ Conclusion

Both the Initial Proposals and the Lesser-Scale Alternatives reintroduce many water uses onto the Fan Pier and Pier 4 sites. However, the Lesser-Scale Alternatives go beyond the Initial Proposals in meeting the public objectives to increase both recreational boating and water transportation services in Boston Harbor.

Navigational Issues

All of the proposed water-related facilities lie within the State Harbor Line and U.S. Pierhead and Bulkhead Line established as of 1940. The facilities as proposed should not interfere with the Boston Main Ship Channel, which lies approximately 200 yards to the north of Pier 4.

Construction Issues

The potential impacts associated with the dredging and removal of the submerged hull of the Peter Stuyvesant from the marina basin, the excavation of the canal, and the schedule for constructing the proposed water based facilities are discussed in Chapter VI.1, Water Quality, and Chapter VI.3, Construction.

MITIGATION MEASURES

The proponents are committed to continuing their work with the State Interagency Coordinating Committee, the Water Transportation Task Force, boat operators, harbor advocates, and other interested groups to provide appropriate water-related uses as an integral part of their proposed mixed-use developments.

VI.1

Construction and Operations Issues

Water Quality

INTRODUCTION

This section describes the existing natural environment of the Fan Pier and Pier 4 sites, and discusses any effects the proposed developments and their alternatives might have on water quality, vegetation, wildlife, marine life, harbor circulation and flushing, and 100 year flood levels. Included in the discussion are descriptions of existing conditions, proposed activities and any related impacts and benefits, and proposed mitigation measures.

The technical analyses conducted for this section, the proposed dredging procedure and many of the impact mitigation procedures were selected based on a series of meetings with the Fan Pier Federal Advisory Group. This group--specially formed to assist coordination for this project--includes representatives of: U.S. Army Corps of Engineers (organizer and chair), U.S. Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service, National Marine Fisheries, Massachusetts Division of Water Pollution Control, and the Massachusetts Office of Coastal Zone Management.

The developers will continue to meet with this group to review this Draft EIR, to coordinate responses to comments on the Draft EIR for the Final EIR, to seek input in preparing the various environmental permits applications that will be filed for the Fan Pier and Pier 4 Developments, and to coordinate public meetings and hearings.

■ Existing Site Conditions

The Fan Pier and Pier 4 sites are located at the mouth of the Fort Point Channel, extending eastward to Commonwealth Pier. The Fan Pier site consists of 15.9 acres of filled land and 2.6 acres of open water (see Figure VI.1-1). Filling of the Fan Pier has occurred

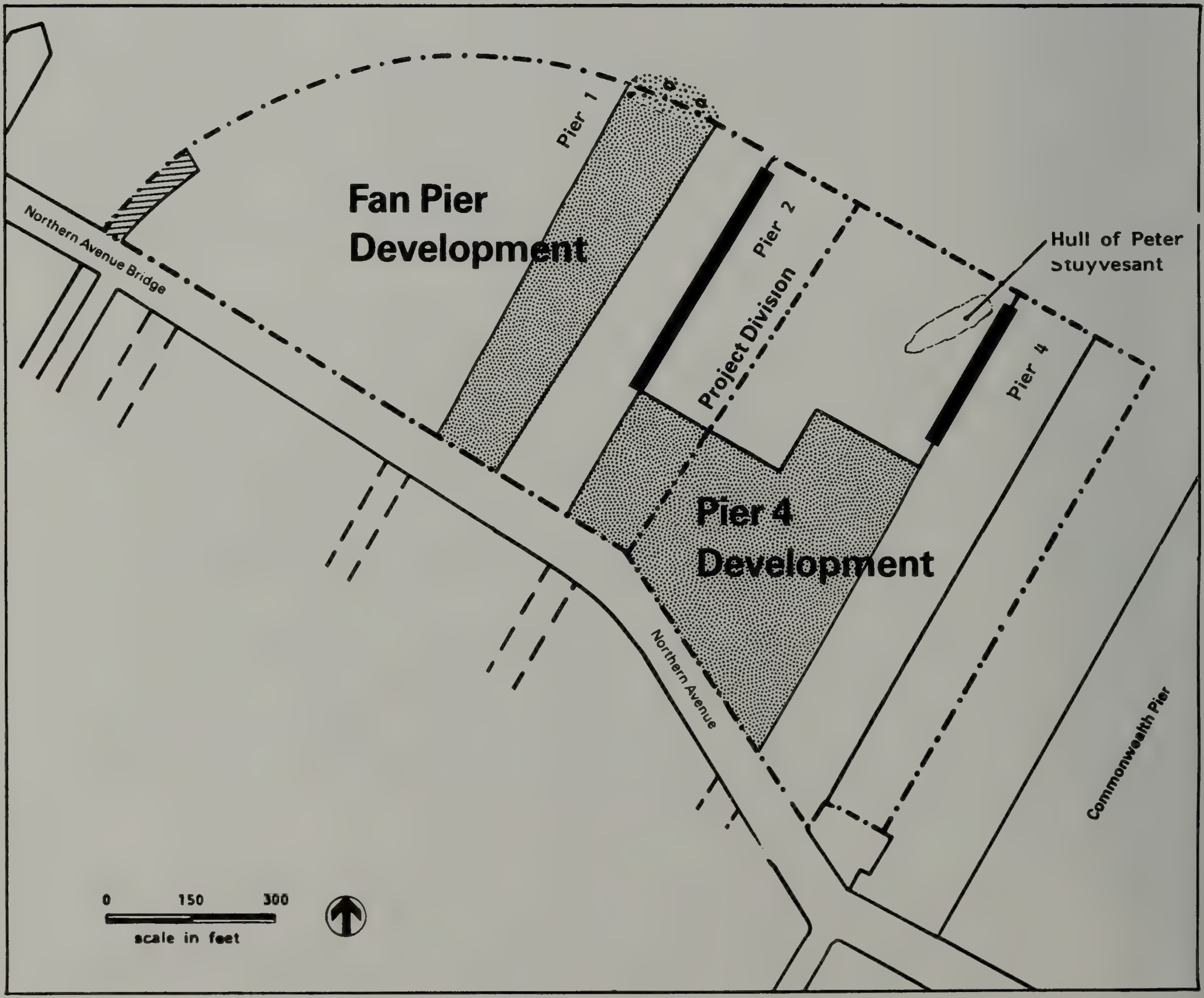
FIGURE VI.1-1
Existing Site
Conditions

▨ Decked Area

■ Failed Bulkhead

▩ Rock Dike

▒ Recently Filled Land (1969-1971)



over the last 100 years, as discussed in the "Tidelands" section elsewhere in this Chapter. A curved granite block seawall protects the filled land. At one point in the curving face of the Fan Pier seawall, a rock dike was dumped in place during filling, creating a large pile of granite blocks in the water adjacent to the pier. On the eastern side of the Fan Pier, the seawall shows signs of imminent failure. At the western edge of the Fan Pier, a small area (0.15 acres) of pile-supported decking is used as a landing for an excursion boat operator. There are approximately 100 piles associated with this decked structure. Overall, the decked area is in need of repair.

The Pier 4 site, which is nearly totally paved, is comprised of 8.9 acres of pier structure and filled land (3.6 acres of pile-supported decking) and 7.5 acres of open water. Most of the filled area on Pier 4 is protected from the sea by sloped rip-rap walls, while the rest is contained by sheet steel bulkheading. The decking of Pier 4 used for parking is in need of repair and strengthening as is the bulkhead along the west side of the pier. The bulkhead had a major failure in the 1970's. While the failed portion was stabilized with rock backfill, the remaining portions are also in need of similar stabilization. The hull of the Peter Stuyvesant (used as a restaurant/cocktail lounge before it sank in 1978) and a crib which supported the vessel lie below mean low water on the west side of the Pier 4 restaurant.

Land elevations on the Fan Pier and Pier 4 sites average 17 feet above mean sea level (msl), which is well above the +10.0 foot (msl) 100 year flood level estimated by the U.S. Army Corps of Engineers (ACOE). The entirety of each site is reported by the Federal Emergency Management Agency (FEMA) to be within the C Zone (an area of minimal flooding) and as such, is above the 100 and 500 year flood boundaries.

■ Proposed Construction and Redevelopment

The master plans considered for this EIR call for the complete redevelopment of the Fan Pier and Pier 4 sites, with the exception of the existing Pier 4 restaurant which will remain (see Figure VI.1-2). For both projects, the existing water line will be respected. There will be no new fill, except where rip-rap may be added to support failing seawalls. Temporary fill (clean, coarse aggregate) may be used during construction, but it will be removed upon completion.

New sheet steel bulkheads may be driven along the alignment of existing seawalls or rip-rap. Most of the existing land area will be excavated for underground

FIGURE VI.1-2
Fan Pier and Pier 4 Master Plans

Legend

▨ Pile-Supported Decking

▩ Harbor Fill

☰ Excavation for New Canal

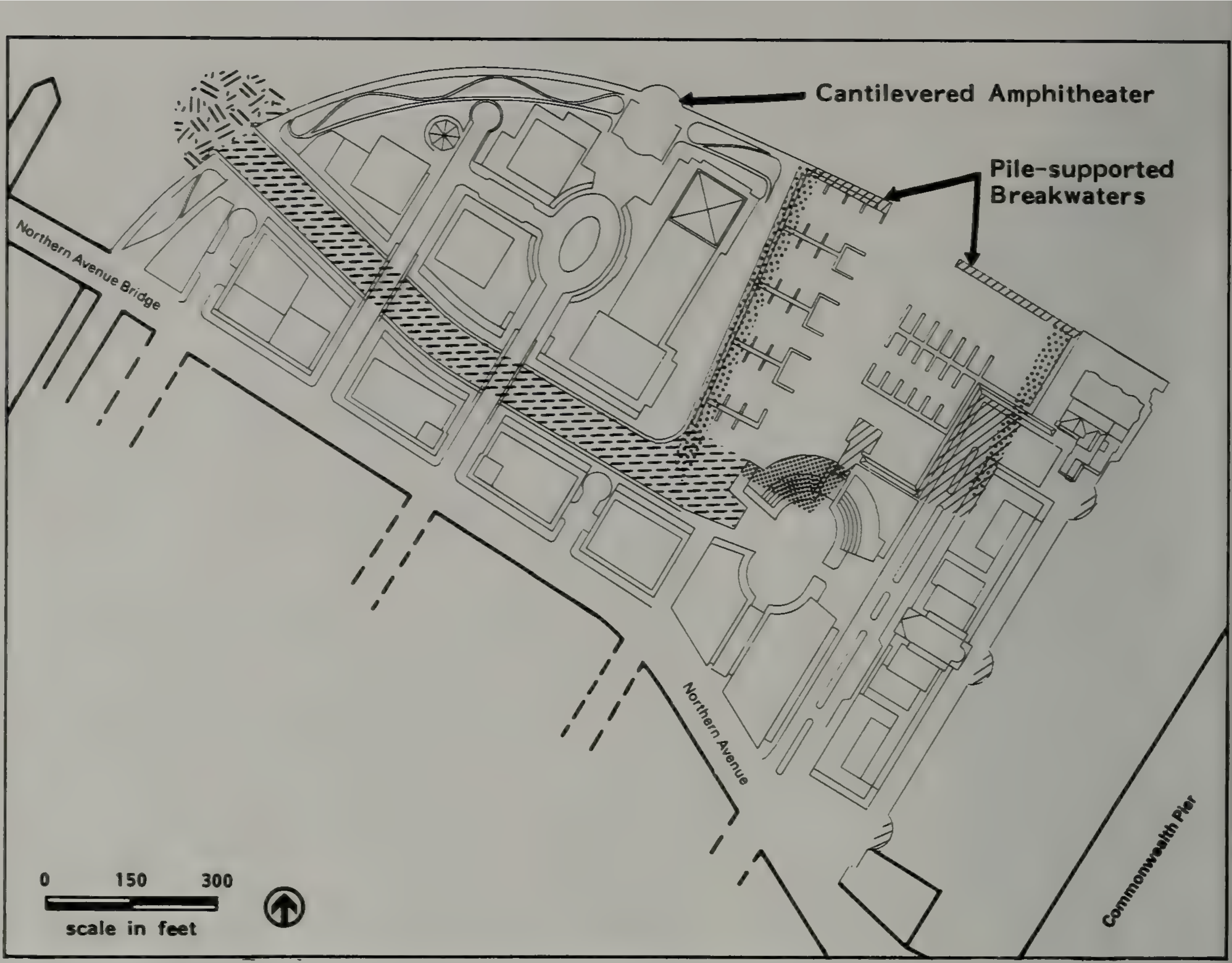
░ Stabilizing Fill (Riprap to Support Failing Seawalls)

▧ Temporary Fill (During Construction Phase Only)

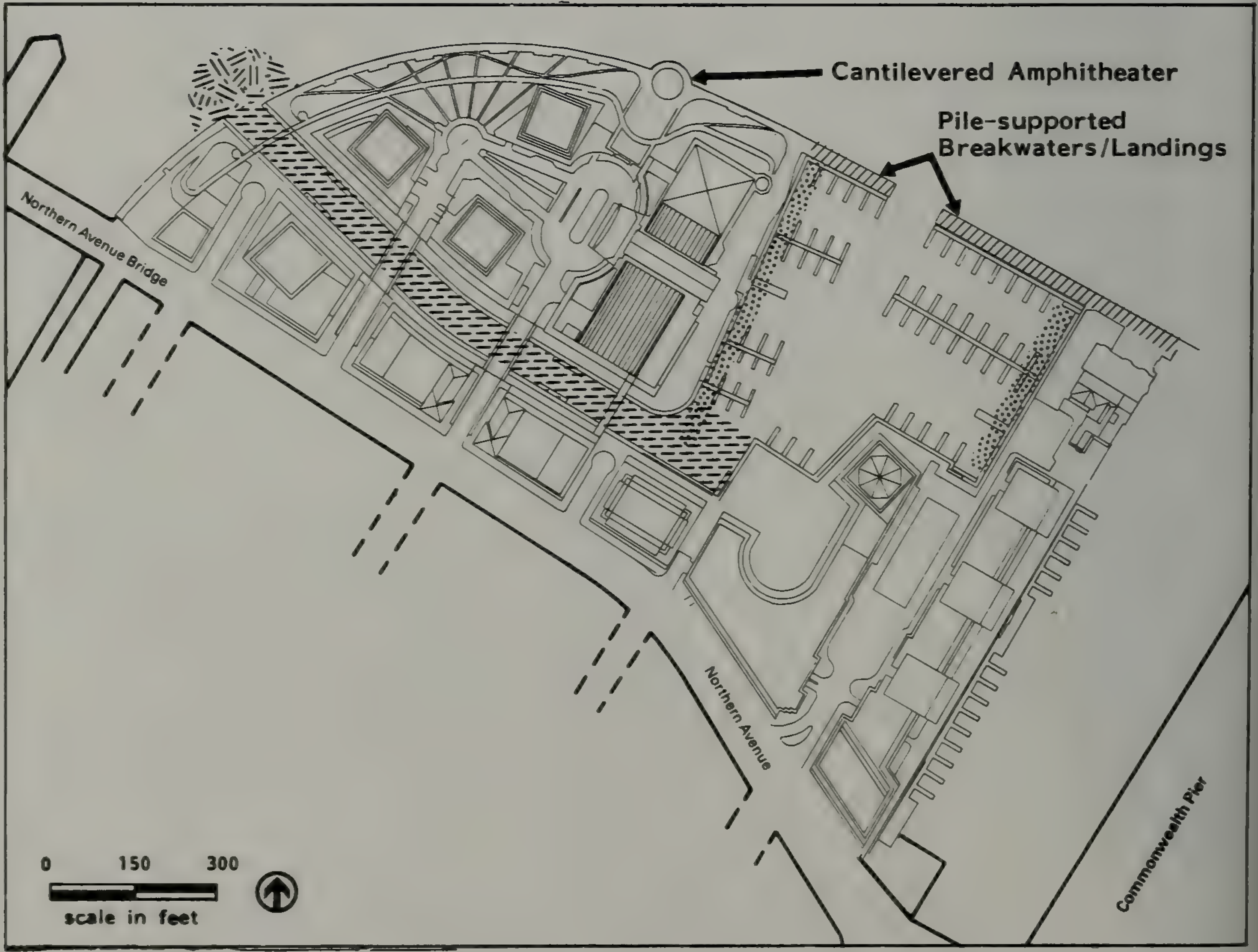
Notes:

1 Floating docks in marina and along canal edges are pile-moored.

2 Pile-supported marina structures will be built over/across stabilizing fill.



Initial Proposals



Lesser-Scale Alternatives

parking. Slurry wall construction techniques will be used to define and support the edge of the excavated areas.

On the Fan Pier site, the existing decking will be removed and replaced by a new landing stucture for use by excursion boats and others. A new canal will be excavated, connecting the Fort Point Channel with the new proposed marina between Fan Pier and Pier 4. The new canal will be approximately 80 to 90 feet wide, 1,000 ft long, and 10 feet deep at mean low water (mlw). It will be constructed in the dry to minimize water quality impacts. Both sides of the canal will be lined by pile-moored floating docks.

The marina will cover approximately 6.8 acres of open water. Dredging for the marina will occur (to -15 feet mlw) to provide adequate water depths for navigation. Two pile-supported breakwaters will be constructed to define the fairway into the marina. Panels attached to the breakwater supports will reduce wave energies from wakes and storms, creating a safe harbor for general public and commercial use during emergencies. The breakwater will be designed to facilitate continuous flushing of harbor waters through its structure. The marina docks will be constructed of floating dock segments, moored by piles.

Given the inter-related physical and functional attributes of the two developments, this water quality analysis will examine the environmental effects of paired combinations of the alternatives: (i) No-Build Alternative for Fan Pier and Pier 4; and (ii) Lesser-Scale Alternatives for Fan Pier and Pier 4. The Initial Proposal and Lesser-Scale Alternatives for the Fan Pier Project are not significantly different relative to water quality. For the Pier 4 project, the Initial Proposal represents a worst case scenario in that it proposes filling of the harbor and construction of large areas of pile-supported decking for non-water dependent uses. As appropriate, additional information as to the impacts of the Pier 4 Initial Proposal will be discussed by means of comparison with the Pier 4 Lesser-Scale Alternative.

DESCRIPTION OF THE ENVIRONMENT

■ Existing Vegetation and Wildlife

The Fan Pier site contains limited amounts of vegetated habitat consisting of:

Ragweed	Ambrosia artemisiifolia
Goldenrods	Solidago spp.
Grasses	Poaceae
Plantain	Plantago sp.
Reed grass	Phragmites australis

Beach pea	Lathyrus maritimus
Red maple	Acer rubrum
Tree-of-heaven	Ailianthus altissima
Dandelion	Taraxacum officinale

Wildlife at the Fan Pier site consists of:

Herring gull	Larus argentatus
Ring-billed gull	Larus delawarensis
Greater Black-backed gull	Larus marinus
European starling	Stornus vulgaris
Rock dove (pidgeon)	Columbia livia
Double-crested cormorant	Phalacrocorax auritus
Norway rat	Rattus norvegicus
House mouse	Mus musculus

There are no rare or endangered species, according to the U.S. Fish and Wildlife Service. The Pier 4 site has little, if any, vegetation and wildlife.

■ Existing Water Quality

Water within Boston Inner Harbor is classified as SC by the Division of Water Pollution Control (DWPC). Such waters are designated as suitable for the protection and propagation of fish and marine life and for secondary contact recreation. Class SC water quality criteria specify: dissolved oxygen (DO) levels of no less than 6.0 mg/l; a pH range of 6.5 to 8.5; and no fecal coliform bacteria in excess of a geometric mean of 1,000 organisms per 100 ml.

While no long-term, site-specific water quality data exist for the project area, extensive recent water quality data are available from three major sources. These are: (i) water quality and elutriate analyses conducted for several recent Boston Harbor dredging projects; (ii) a DEQE water quality survey conducted in the Boston Harbor in July, 1982 and summarized in Table VI.1-1; and (iii) monitoring by Massport during the construction of the Boston Marine Industrial Park.

Permit conditions for filling at the Boston Marine Industrial Park (BMIP) required Massport to conduct a water quality monitoring program at two locations. Location 1 was off the proposed BMIP fill area in South Boston, and Location 2 was off the mouth of the Fort Point Channel near the Fan Pier project site.

While overall water quality in the Fort Point Channel area meets the SC standards, violations for many parameters are common. For example, data from Massport (see Table VI.1-2) indicate that DO levels are often found below the 6.0 mg/l minimum at both sampling locations, off the end of the Fort Point Channel as well as in the outer reaches of the Inner Harbor. Additionally, the DWPC data indicate contraventions of

TABLE VI.1-1
Water Quality
Summary
Boston Inner
Harbor (mg/l)

Parameter	Maximum	Minimum	Average
pH1	8.0	7.8	7.8
Suspended Solids1	35.0	16.0	22.0
Oil and Grease1	2.6	0.0	1.3
Total Kjeldahl Nitrogen1	2.4	0.64	1.23
Ammonia Nitrogen1	0.19	0.01	0.07
Sulfate1	3,325	1,950	2,488
Total Phosphorus1	0.10	0.02	0.05
Conductivity1 (umhos/cm)	40,000	34,000	38,800
Total Coliform1 (# organisms/100 ml)	2,400	230	7113
Fecal Coliform1 (# organisms/100 ml)	380	20	1053
Chloride1	14,000	11,000	13,300
Arsenic2	0.001	--	0.001
Cadmium2	0.014	0.005	0.009
Chromium2	0.004	--	0.004
Copper2	0.01	0.0014	0.006
Lead2	0.017	0.002	0.002
Mercury (g/l)2	0.05	0.005	0.035
Nickel2	0.02	0.004	0.016
Silver2	0.08	--	0.08
Vanadium2	0.04	--	0.04
Zinc2	0.145	0.002	0.05
Dissolved Oxygen1			
Surface	8.5	5.2	7.2
Middle (13'-18')	6.8	5.4	5.9
Bottom (26'-40')	6.8	3.4	5.5

Sources:

1/ MA DEQE from sampling locations BH03 (Boston Inner Harbor north of mouth of Charles River near U.S. Naval Reserve), BH04 (tidal portion of Charles River downstream of Charlestown Bridge) and BH05 (Main Channel of Boston Inner Harbor near mouth of Fort Point Channel) surveyed July 14-15, 1982, Personal Communication.

2/ U.S. Army Corps of Engineers, 1981 and Massport Seaport Development, 1980.

3/ Geometric mean of DWPC Data.

TABLE VI.1-2
Ambient
Boston Harbor
Water Quality
Nov. 1980-
Nov. 1981
(Massport:
1982)

Sampling Location		Total Suspended Solids (mg/l)		Dissolved Oxygen (mg/l)		PCB (mg/l)	
		$\bar{X}$	R	$\bar{X}$	R	$\bar{X}$	R
Location 1 (Off South Boston Seaport Develoment							
Low Tide	Surface	8.1	0.3-56.2	8.2	4.6	0.65	0.05-1.0
	Mid	10.5	0.3-114.0	8.5	4.9	--	--
	Bottom	18.0	0.3-129.0	8.2	4.8	--	--
High Tide	Surface	10.3	0.3-87.0	9.0	3.4	0.74	0.05-1.0
	Mid	10.3	0.3-59.0	9.5	5.6	--	--
	Bottom	21.2	0.3-136.3	9.2	5.2	--	--
Location 2 (Off Fort Point Channel)							
Low Tide	Surface	8.7	0.3-69.0	8.1	4.1	0.82	0.02-1.0
	Mid	8.4	0.3-65.0	8.1	3.9	--	--
	Bottom	22.7	0.3-169.0	7.6	4.1	--	--
High Tide	Surface	8.1	0.3-60.0	8.4	4.5	0.54	0.05-1.0
	Mid	11.6	0.3-86.0	9.0	5.3	--	--
	Bottom	18.8	0.3-145.9	8.3	4.9	--	--

$\bar{X}$ = Mean
R = Range

the water quality criterion for DO at stations located in the Inner Harbor and in the Main Shipping Channel opposite the end of Fort Point Channel. Water quality monitoring data obtained within close proximity to Fan Pier also indicate that the minimum 6.0 mg/l DO requirement is not met approximately 20% of the time.

Average concentrations of soluable metals are generally within acceptable ranges, however, higher concentrations of arsenic, copper, and lead have occasionally been found. Total suspended solids are highly variable as indicated by the Massport data, and are typically a function of storm conditions.

There are neither combined sewers nor combined sewer outfalls/overflows (CSOs) in or near the project areas in South Boston. Numerous CSOs and raw sewage discharges are found elsewhere in Boston Harbor. Wet weather and dry weather flows from these sewers contain considerable concentrations of sediments, metals, bacteria, and substantial oxygen demand. The CSO locations closest to the Fan Pier and Pier 4 are located at the New England Aquarium (approximately 1,900 feet northwest of the Fan Pier) and at Northern Avenue on the west side of the Fort Point Channel (approximately 700 feet west of the Fan Pier).

- Existing Water Depth and Sediment Quality

The need for sediment dredging was determined by measuring existing water depths and comparing them to the navigational requirements for the marina. First, bathymetric measurements were taken for the waters surrounding Fan Pier and Pier 4. This was then followed with field sampling of sediments and laboratory testing of sediment samples. The bathymetric data for the site is shown in Figures VI.1-3 and VI.1-4. A tongue of land extends north from the bulkhead nearest Northern Avenue, separating a 30-foot deep channel along the Pier 2 bulkhead from a shallower 20 foot channel alongside Pier 4. In order to provide for adequate draft in the proposed marina, dredging to -15 ft mlw was found necessary, resulting in 41,700 cubic yards (cy) of material being dredged.

The water quality impacts of dredging are dependent on the sediment quality, method and timing of dredging, quantity of dredging, method and location of disposal, and the use of mitigation measures.

A two-phase program was used to determine sediment quality. The first phase consisted of collecting and analyzing surface grab samples from the sampling locations shown in Figure VI.1-4. Samples 1, 2, and 3 were collected with a Ponar Dredge on May 21, 1985. The fourth sample was collected in 30 feet of water one week later on May 28, 1985. The results of a survey

FIGURE VI.1-3
Bathymetry and Sediment Sampling Stations for the Fan Pier and Pier 4 Sites

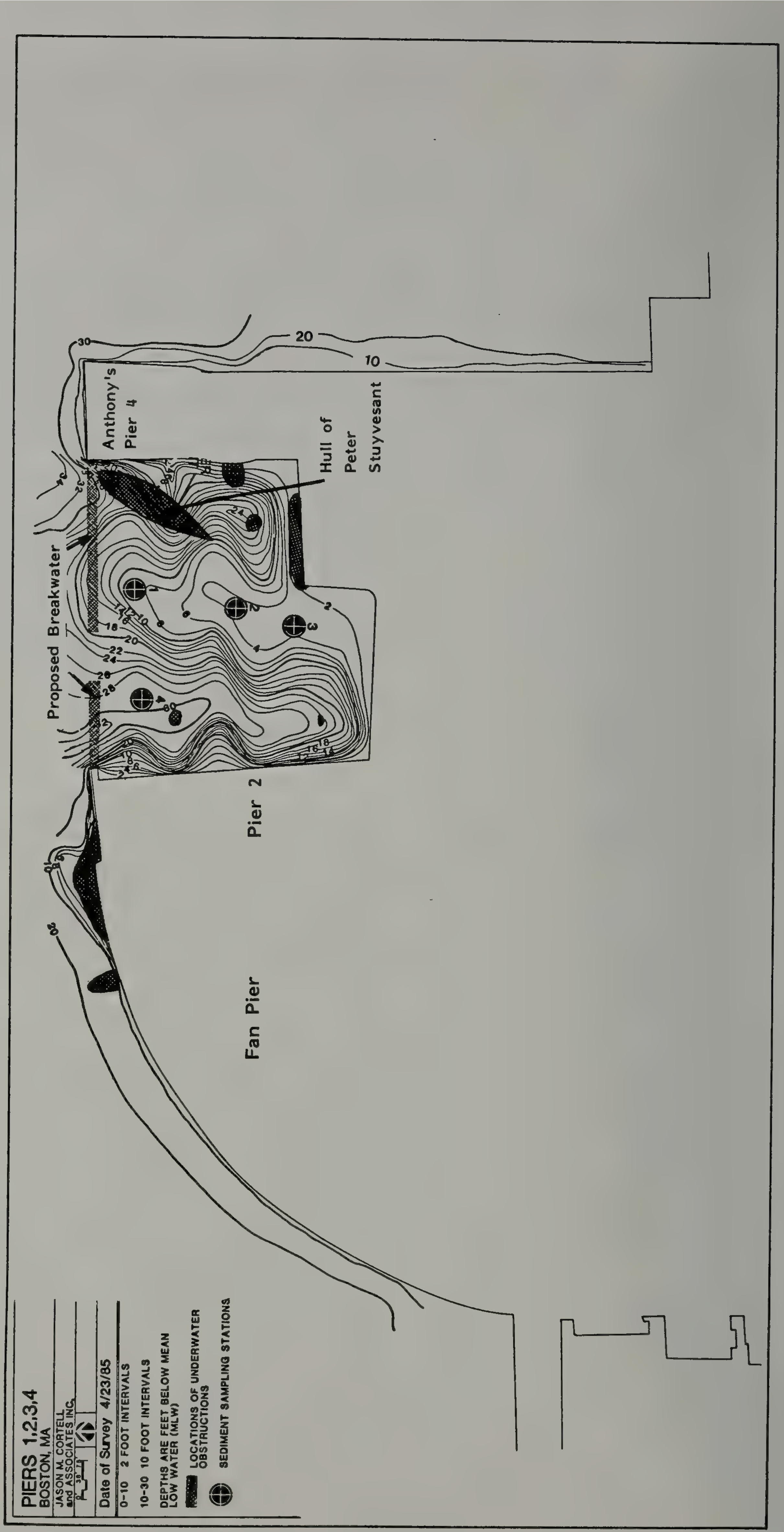
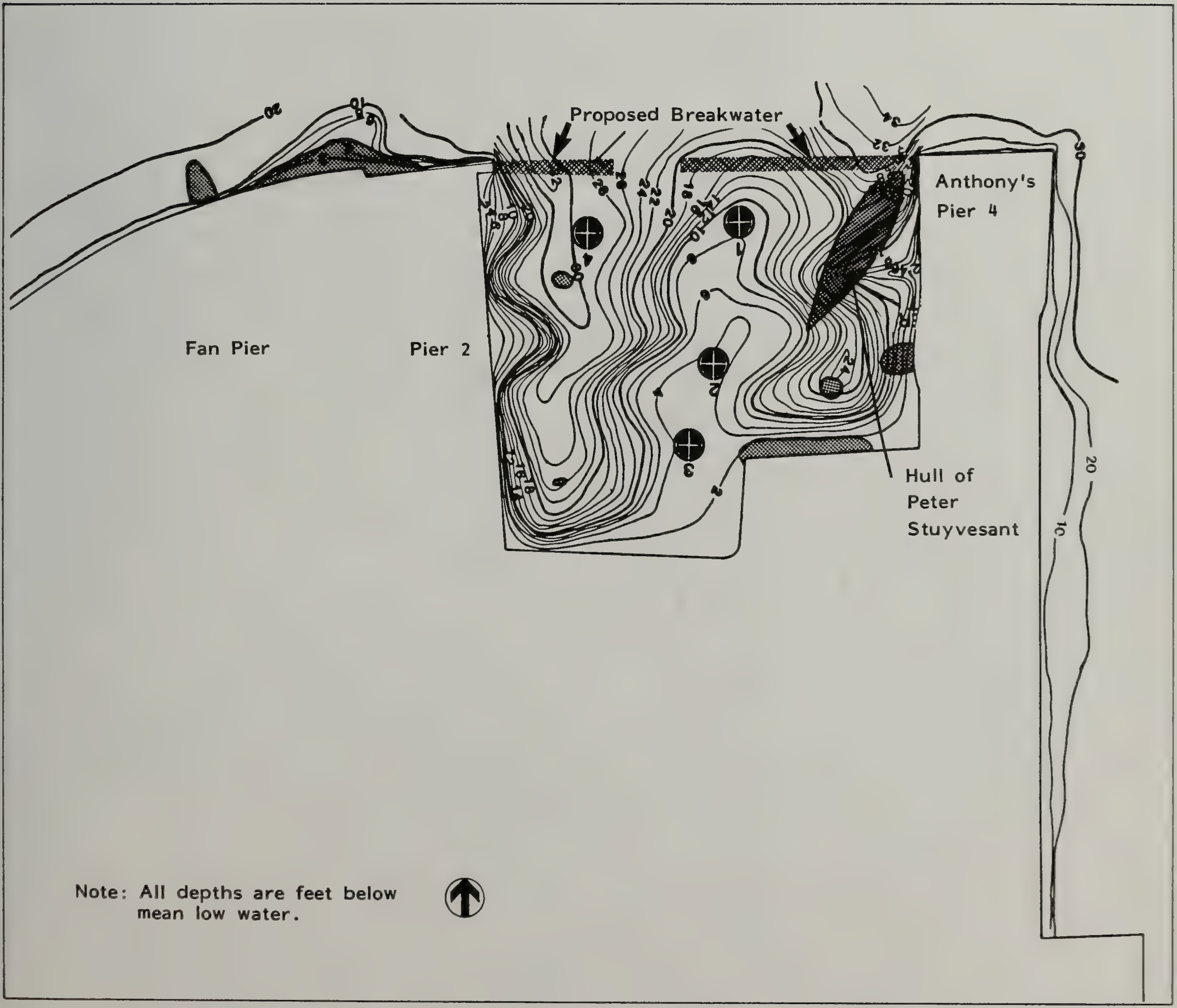


FIGURE VI.1-4
Sediment Sampling
Stations and
Bathymetry



Note: All depths are feet below mean low water.

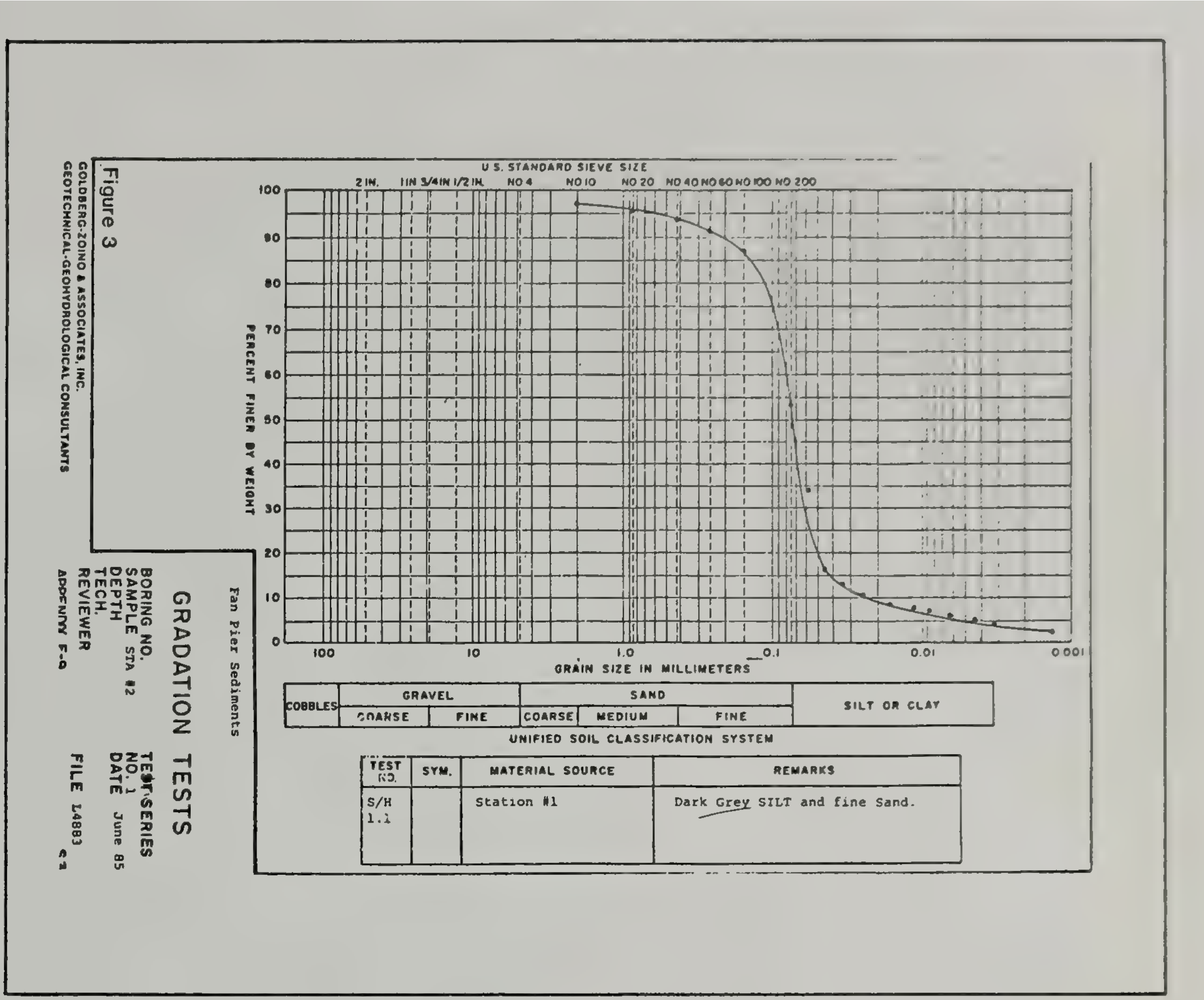
with probes at low tide confirmed that the several areas of shallow water along the periphery of the seawalls are composed of rubble and rock. The tongue of land in the location of the former Pier 3 was found to be composed of sands and silts with little or no mud. The accumulation of mud on this feature is believed to be kept low by wave energy. The sand and silt found in the samples are believed to be native overburden which was at the site before the Colonial Period and are not fill. These findings are in general agreement with the soil profile data provided by Haley & Aldrich (Preliminary Geotechnical Evaluations for the Proposed Development of Piers 1, 2, and 3. South Boston, MA. 1984). The fourth sample (Station 4) collected in deep water was a typical marine mud with high water content. The results of the grain size analyses are shown in Figure VI.1-5.

The surface samples collected in Phase 1 of the sediment testing program were analyzed for bulk chemical composition and elutriate qualities. Results of the bulk chemical analyses are shown in Table VI.1-3. These results may be compared with the State criteria for the chemical and physical classification of sediments (Table VI.1-4). There was variability found between the samples. Those samples collected on the tongue of shallow land (Samples 1-3) were found to be quite clean relative to Sample 4 (marine mud). In Samples 1, 2 and 3 (from the area to be dredged) it was found that concentrations of cadmium, copper, lead, mercury, nickel, zinc, oil and grease, and PCB's were within Category I limits. Arsenic was found to be in Category III at Station 1, and within the Category II range at Stations 2 and 3. Considerably higher concentrations of cadmium, chromium, copper, lead, nickel, and zinc were found in the marine muds from Station 4. PCB's at Station 4 are within Category I limits. These data are further evidence that the materials to be dredged are native soil deposits and are relatively uncontaminated.

To estimate the potential impacts which might result from release of sediment contaminants to the water column, elutriate analyses were conducted on the sediments. In this analysis, samples of sediment from the project area are mixed with seawater to simulate the effects of suspension during dredging. Chemical analyses are then conducted on the water and compared to background (receiving) water quality conditions to determine the amount of chemical release.

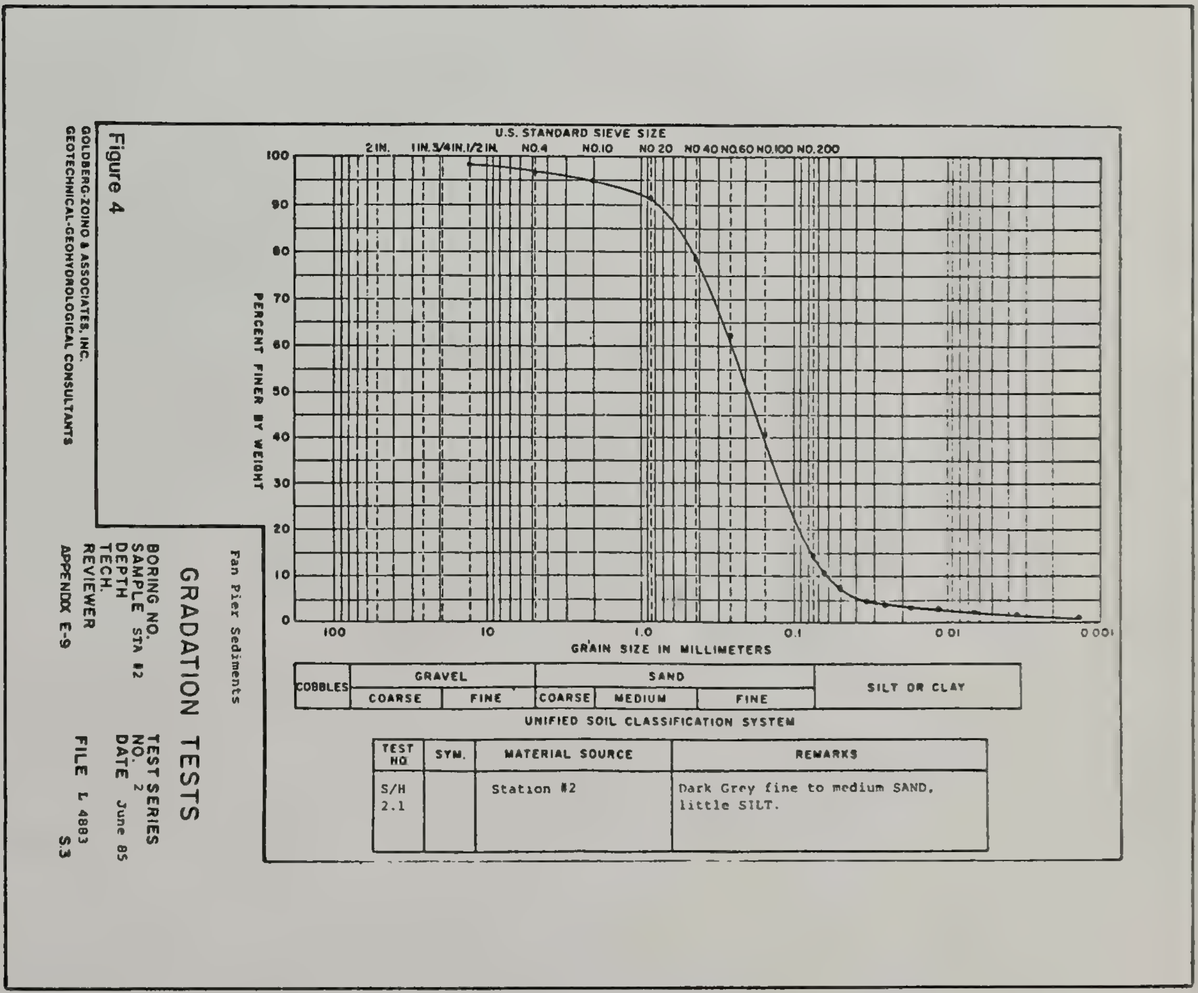
Results of the elutriate analyses are presented in Table VI.1-5. The data indicate a minor release of lead and nickel and a larger (four fold) release of oil and grease for Samples 1-3. The elutriate analysis for Sample 4 shows a minor increase in oil and grease as compared to receiving waters.

FIGURE VI.1-5
Grain Size
Analysis



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S/H 1.1		Station #1	Dark Grey SILT and fine Sand.

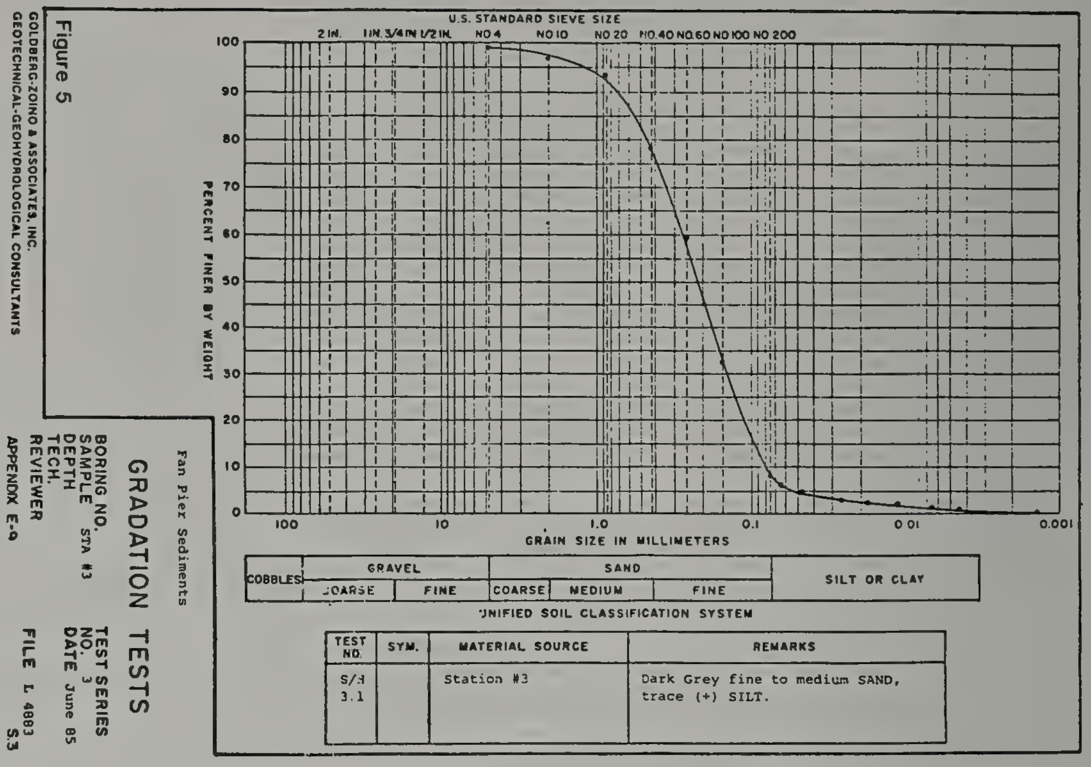
Station 1



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S/H 2.1		Station #2	Dark Grey fine to medium SAND, little SILT.

Station 2

FIGURE VI.1-5
Grain Size
Analysis
(cont.)



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S/H 3.1		Station #3	Dark Grey fine to medium SAND, trace (+) SILT.

Figure 5

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

Fan Pier Sediments

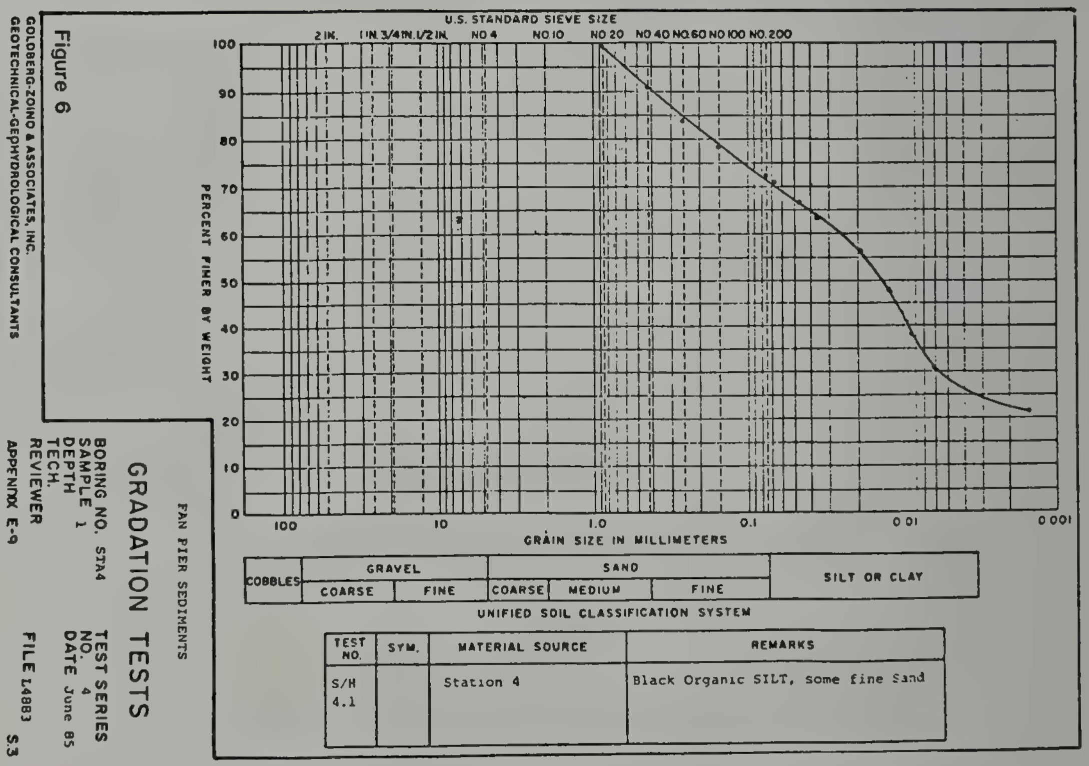
GRADATION TESTS

BORING NO.
SAMPLE STA #3
DEPTH
TECH.
REVIEWER
APPENDIX E-9

TEST SERIES
NO. 3
DATE June 85

FILE L 4883
S.3

Station 3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S/H 4.1		Station 4	Black Organic SILT, some fine Sand

Figure 6

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

FAN PIER SEDIMENTS

GRADATION TESTS

BORING NO. STA4
SAMPLE 1
DEPTH
TECH.
REVIEWER
APPENDIX E-9

TEST SERIES
NO. 4
DATE June 85

FILE L4883
S.3

Station 4

TABLE VI.1-3
Surface Sediment Analysis: Bulk Chemical Composition

Parameter	Station 1	2	3	4
Arsenic (mg/kg)	58	19	15	29.1
Cadmium (mg/kg)	3.9	1.8	2.1	5.6
Chromium (mg/kg)	39	14	17	270
Copper (mg/kg)	35	21	21	294
Lead (mg/kg)	39	27	32	294
Mercury (g/kg)	0.080	0.080	0.055	0.05
Nickel (mg/kg)	17	8.9	12	42
Zinc (mg/kg)	68	51	50	378
Oil and Grease (mg/kg)	658	520	518	3500
Percent Water	39.8	19.3	19.8	71.2
Total Kjeldahl Nitrogen (mg/kg)	1096	498	363	272
Total Volatile Solids (%)	40	17	18	10.5
Total PCB (ug/kg)	134	41.8	35.8	112

TABLE VI.1-4
Massachusetts Criteria for Classification of Dredge or Fill Material By Chemical Constituents (ppm)

Parameter	Category I	Category II	Category III
Arsenic (As)	10	10-20	20
Cadmium (Cd)	5	5-10	10
Chromium (Cr)	100	100-300	300
Copper (Cu)	200	200-400	400
Lead (Pb)	100	100-200	200
Mercury (Hg)	0.5	0.5-1.5	1.5
Nickel (Ni)	50	50-100	100
Polychlorinated Biphenyls (PCBs)	0.5	0.5-1.0	1.0
Vanadium (V)	75	75-125	125
Zinc (Zn)	200	200-400	400

Massachusetts Criteria for Classification of Dredge or Fill Material By Physical Characteristics (percent)

Parameter	Type A	Type B	Type C
Percent silt-clay	60	60-90	90
Percent water	40	40-60	60
Percent volatile solids (NED method)	5	5-10	10
Percent oil and grease (hexane extract)	0.5	0.5-1.0	1.0

TABLE VI.1-5 Elutriate Analyses Results

Contaminant	Receiving Water	Station 1	2	3	Receiving Water	Station 4
Arsenic (mg/l)	0.42	0.44	0.40	0.42	0.005	0.005
Arsenic (mg/l)	0.42	0.44	0.40	0.42	0.005	0.005
Cadmium (mg/l)	0.08	0.08	0.06	0.07	0.06	0.01
Chromium (mg/l)	0.04	0.04	0.04	0.04	0.04	0.01
Copper (mg/l)	0.06	0.06	0.07	0.06	0.08	0.02
Lead (mg/l)	0.35	0.40	0.40	0.40	0.25	0.005
Mercury (g/l)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Nickel (mg/l)	0.21	0.21	0.23	0.24	0.2	0.01
Zinc (mg/l)	0.08	0.05	0.04	0.05	0.08	0.04
Oil/Grease (mg/l)	25	60	121	104	0.4	1.3
PCB (ug/l)	0.05	0.10	0.06	0.05	0.10	0.10

TABLE VI.1-6 Core Logs

Station 1

B-125 9/20/85

0.0-0.4	organic silty medium sand; shells
0.4-3.4	organic fine sand, silt
3.4-3.6	gradational organic silty fine sand
3.6-4.6	clean slightly silty very fine sand

Station 3

B-126 9/19/85

0.7-0.9	organic silt, trace fine sand; soft shell clam shell
0.9-3.8	organic silt
3.8-4.0	organic silty fine sand
4.8-5.2	clean fine to medium sand, trace silt

The second phase of sediment analysis was conducted in conjunction with the geotechnical boring program. Six-foot long, three-inch diameter, Shelby tube samples were collected from Stations 1 and 3 in order to obtain deeper samples for bioassay/bioaccumulation analyses, as well as further chemical and physical testing. One hundred percent recovery was acheived and the logs for the cores are shown in Table VI.1-6. Core log data also agree with other geotechnical information as conclusive evidence that the materials to be dredged are native soils.

Chemical analyses were also conducted on one composite sample of surface sediment from Stations 1 and 3 as well as a composite sample of the 5-foot long cores. The analysis indicates that arsenic is again the element in highest concentration and is present in a borderline Category III level. All other parameters were found to be very low in concentration, well within Category I limits. Finding arsenic at Category III concentrations is not surprising because the USGS also found borderline Category II-III arsenic levels in cores of native clay within the Inner Harbor (Third Harbor Tunnel, I-90/Central Artery, I-93 Draft EIS/EIR. Appendix 7, December, 1982).

- Existing Circulation and Flushing

Circulation and flushing between Fan Pier and Pier 4 in the proposed marina area are not impeded and occur regularly with the rise and ebb of tidal waters. Flushing was calculated by summing the water volume below mean low water and the tidal prism and then dividing by the tidal prism. Under existing conditions flushing is found to take place once every 2.31 tidal cycles or every 30.0 hours.

Wave energy can influence conditions in the site especially as large vessels pass by. It is not unusual to find wake induced waves of 1.5 feet or more which is one reason for the proposed breakwater at the entry to the marina.

- Existing Marine Life

Site-specific sampling for marine species was not conducted because a more comprehensive listing of marine life known to inhabit the Inner Harbor--including macrobenthos, finfish, shellfish, marine algae, and marine mammals--is available (DEIS/DEIR for the Third Harbor Tunnel Project, Appendix 7, December 1982). These data indicate that the dominant macrobenthic species between Piers 2 and 4 would be the pollution tolerant worms such as Capitella capitata, and Polydora ciliata. Any number of approximately four dozen finfish species could be found at the site but the most common would be winter flounder, smelt, herring and smaller forage species. Soft shell clams do not exist at the site since possible habitat areas are always submerged. Mussels are found on rocks under and along Pier 4. Marine algae at the site include scattered Fucus, Ulva, Cladophora, and Enteromorpha. Although none have been sighted, harbor seals are the most likely marine mammal which could be present, now or after development.

PROBABLE PROJECT IMPACTS

■ Effects on Water Quality

Water quality impacts may result from: (i) removal of piles at the west side of Fan Pier; (ii) removal of the crib of the Peter Stuyvesant and the hull of the vessel itself; (iii) driving new piles; (iv) dredging; (v) placement of rip-rap to stabilize failing seawalls; (vi) temporary filling for construction; and (vii) dewatering of foundations. During each of these operations, some sediment will be suspended in the water column. In addition to the resulting turbidity, some minor releases of metals and nutrients may occur, possibly affecting the natural biota or water users. Pile and crib removal and pile driving will involve a slight, temporary increase of suspended solids. Removal of the hull of the Peter Stuyvesant will also result in a temporary increase of suspended solids, and may lead to minor, short-term releases of oil. Dredging, placement of stabilizing rip-rap, temporary fill placement, and foundation dewatering will constitute the larger short-term potential impact to water quality.

Hull Removal

Removal of the hull of the Peter Stuyvesant will be necessary to accommodate the marina where the hull now lies (see Figure VI.1-1). This removal will be conducted from the water with heavy lift equipment. A salvage contractor who previously tried to raise the vessel reports there may be 500 to 1,000 gallons of fuel oil still in the hull. The presence and extent of fuel oil in the hull will be ascertained, and a salvage program will be prepared in consultation with DEQE to avoid or mitigate the effects of a possible release of such material. Once the hull has been recovered, steel portions of the hull will be scrapped and wood decking will be disposed of at an approved landfill. The former crib and other piles in the area will be cut at the mud line and disposed of at an approved landfill.

Dredging

As discussed previously, elutriate analyses of the surface sediment in the area to be dredged resulted in a small release of lead and nickel and a 2-4 fold release of oil and grease. This condition and increased turbidity will be present for the duration of the dredging program, after which there will be a return to background water quality. Without mitigation the contaminated water would flow from the site and be entrained in the ebb and flood currents and dispersed to the vicinity of the North Jetty at the Boston Marine Industrial Park on the ebb tide and near the Coast Guard base on the flood tide. These bounds are the normal area of tidal excursion. However, the dilution within this area will be so great that normal background water quality conditions would be present within 1,000 feet either side of the site. The use of mitigation measures, particularly silt curtains around the dredging area, can significantly reduce these releases. Removal of 41,700 cy of dredged material can be completed within 3 to 5 weeks depending on the contractor, and with proper mitigation, can be planned to take place at any time of the year.

Bioassay/bioaccumulation analyses are being conducted to determine the suitability of these sediments for ocean disposal at the Massachusetts Bay Foul Area. The results of these analyses will be reported in the Final EIR.

Pile Installation

Construction of the Fan Pier Development will require driving 660 treated timber piles for the marina. It will be necessary to drive approximately 74 steel pipe piles for the Fan Pier portion of the breakwater. Pier 4 construction will require that 230 treated timber piles be driven for the remainder of the marina and 100 steel pipe piles be driven for the Pier 4 breakwater. Marina and breakwater construction will not be phased with each project's construction schedule, but will take place as one process. All piles will be percussion driven, and no jetting will take place.

The Initial Pier 4 Development Proposal would have required a 0.65 acre pile-supported deck and would have required approximately 275 piles for support. These piles would have been the same low displacement piles, and would have been driven with hammers rather than by jetting.

The Lesser-Scale Alternative calls for a larger Pier 4 breakwater than the Initial Proposal. Rather than stepping back as the Initial Proposal indicates, the breakwater on the Lesser-Scale Alternative would be one continuous pier from the front of the Pier 4 restaurant to the northern end of the breakwater, at the inlet. This larger breakwater would require additional decking and hence, additional piles. While additional short-term impacts would be associated with these activities, the net effect to long-term water quality will be negligable.

As part of the Fan Pier Lesser-Scale Alternative, a pile-supported deck or "Marina Walk" has been proposed. This deck would be constructed over the rip-rap wall. All piles for this "Marina Walk" will be hammer driven and hence impacts to water quality and marine life will be limited to the same short term construction-related impacts as are expected with other pile installation operations.

In addition to disposal at the Massachusetts Bay Foul Area, on-site disposal of a portion of the dredged materials is being considered. Because the marina only requires a depth of -15 feet mlw for adequate draft, it is possible to side cast portions of the sediment into the 30 and 20 foot deep areas shown on Figure VI.1-4. Because of the complication with mud wave formation during on-site disposal, and the volume of the stabilizing rip-rap, it has been estimated that 8,000 to 10,000 cy can be safely disposed onsite. The balance will be disposed at the Foul Area.

Dewatering of Foundations

To limit lateral seepage of water from the harbor into the foundations for the Fan Pier Development, slurry cut off walls will be placed before excavation, which will take place to +5 feet mlw. Concrete slurry walls will be used on the Pier 4 Development where excavation will proceed to -30 ft mlw. Therefore, the discharge of water containing suspended solids from dewatering will be small in volume (limited to rainwater) and will take place behind silt curtains to allow settling.

Effects From Filling

While the Fan Pier project will not contribute to any net filling (approximately 67,000 cubic yards of water volume will be created by excavation of the canal), it will be necessary to place 14,500 cy of coarse materials and rip-rap as structural backfill along the length of the Pier 2 bulkhead. As discussed previously, the bulkhead is in poor condition and must be stabilized by backfilling during construction. This constitutes the only permanent filling from the Fan Pier Development.

Similarly, backfilling for structural stability along Pier 4 is also necessary. The bulkhead under Pier 4 has failed in the past. Before new structures are placed, additional stabilization is needed. This will require less than 14,000 cy of coarse fill and rip-rap. Again structural backfilling will be the only filling from the Pier 4 Development.

The Initial Proposal for development of Pier 4 would have required filling of approximately 73,000 cubic feet of water volume over 0.14 acres of water surface. The filling would have taken place in the shallowest portion of the project site and would have had no impact to flooding or water quality.

Additionally, about 3,500 cy of temporary fill for construction of the canal ends will be needed. This material will also be coarse (less than 10 percent passing fines), and will be completely removed after construction.

Effects On Circulation and Flushing

The same equation used to determine existing flushing rates was applied to assess the anticipated future flushing rates. The volume of water below mean low water within the area of the proposed marina was recomputed taking into consideration the changed volume from dredging and filling and was then combined with the volume within the canal. Because of the increased volume of water within the prism (from the canal) the results indicate a slight decrease in the flushing time to 2.19 tidal cycles (from 2.31 cycles) or approximately 28.5 hours.

There will be no impediment to flushing and water circulation from the proposed breakwaters between the Fan Pier and Pier 4. The pile-supported breakwater is proposed to be open to water flow below the elevation of -2 feet mlw. Therefore water circulation will not be measurably altered either from construction of the canal or the breakwaters.

Effects on Marine Life and the Fishing Industry

During dredging and site construction one can expect mortality to macrobenthic species, limited amounts of finfish, and mussels. This loss of benthic species results from siltation and physical disturbances of the marine environment associated with dredging and other construction activities, especially placement of the structural backfill and temporary fill at the canal opening. The species being affected, however, have a high recruitment rate and will quickly repopulate the disturbed areas. After the backfill and rip-rap along the bulkhead is in place, the area will have an equal, or higher, habitat value than presently exists.

Because the sites are not used for any commercial fishing activity, there will not be any impact on the fishing industry.

Excavate Disposal

Excavation of the Fan Pier and Pier 4 foundations and underground parking garages and excavation of the Fan

Pier canal will entail the disposal offsite of the excavated materials. A preliminary cut and fill balance for the landside portion of the Fan Pier project indicates a total of 500,000 cy of excavate to be disposed off site. An additional 55,000 cy of material will initially be excavated and later reused, and 24,000 cy will be purchased offsite. On the Pier 4 Development, approximately 520,000 cy will be excavated. The materials to be excavated consist of fill placed over the harbor clays during the 1800s. Because the Ocean Dumping Permit for the Massachusetts Bay Foul Area authorizes disposal only of marine sediments which have been dredged from waters of the United States, these upland materials, including buried marine sediments, must be disposed on land.

DEQE reviews proposals to dispose of excavated materials at landfills or other areas, with the ultimate disposal site determined by the chemical nature of the materials. For those excavated materials with bulk chloride content of less than 250 mg/kg, disposal at inland areas would likely be permitted by DEQE, providing the materials are not significantly contaminated with metals or organic compounds. For materials with bulk chloride concentrations above 250 mg/kg, disposal at areas which drain directly to a marine environment is necessary.

Because some of the materials now onsite have been exposed to salt water, tests are being conducted to determine chloride and metallic content for purposes of defining landside disposal options. These data will be reported in the Final EIR.

Relation to Flood Elevation

On the Fan Pier Development the canal will account for nearly 900,000 cubic feet of additional tidal prism and additional storage. That portion of the structural backfill along Pier 2 is estimated to occupy 11,500 cubic feet of tidal prism. Therefore the development of Fan Pier will result in additional tidal prism and water storage volume with no impact to flood elevations. The lowest portion of the development will be at elevation +17 feet msl.

Development of Pier 4 is estimated to result in the use of approximately 11,000 cubic feet of tidal prism (for structural backfill) water. While there is no net amount of water created, the loss of storage will not result in increased flooding. The lowest elevation of any portion of the Pier 4 Development will also be +17 feet msl and will not be subject to flooding.

MITIGATION MEASURES

Water quality impacts from hull removal, pile driving, dredging, filling, and dewatering can be mitigated primarily by specific construction practices. Many of these practices have been described previously in this Section because they are an integral part of the construction plans for the Fan Pier and Pier 4 Developments and are critical to evaluating their impact. A summary of activities and mitigation practices being considered as part of the plan follows.

■ Hull Removal

Removal of the Peter Stuyvesant hull will be conducted inside a silt curtain and floating boom to ensure that sediment and oil are not released to the harbor. Oil spill pillows and other absorbant materials will be onsite during this process, and an oil pollution cleanup contractor will be under contract. DEQE will be consulted as to appropriate mitigation measures, once the extent of oil in the hull is ascertained.

■ Dredging

Dredging will be performed by means of a clamshell dredge behind 15 foot deep silt curtains. Water quality will be monitored during dredge operations, with particular attention given to turbidity levels near the Hook Lobster Company seawater intake, the New England Aquarium, and the Fish Pier.

■ Pile Driving

Timber piles and steel pipe piles will be driven with percussion methods. No jetting will take place. The piles are low displacement and there will be little to no impact from the driving.

■ Filling

The permanent, stabilizing structural fill along the seawalls will be placed into the water with buckets, rather than dumped. Similarily, temporary fill will also be placed with buckets. Fill sites will be confined with silt curtains. All temporary fill will be removed after construction.

■ Dewatering

The amount of construction dewatering will be greatly reduced due to the use of slurry cut off walls and concrete slurry wall construction techniques that will effectively eliminate lateral water seepage into the excavation areas. Precipitation will be the major source of water that will be pumped from the site. Any dewatering discharge will be conducted behind silt curtains to allow suspended material to settle before being transported any significant distance from the discharge point. On-site settling areas will be used, if needed, to remove suspended sediment before discharge to the harbor.

Construction and Operations Issues
Infrastructure

INTRODUCTION

The purpose of this analysis is: to describe the existing sanitary sewer, water supply, storm drainage, energy, fire and telecommunications systems in the development area; to characterize existing agency/utility plans for upgrading these systems; to determine any effects the proposed Fan Pier and Pier 4 Developments might have on the existing systems; and to examine measures to mitigate adverse environmental effects. In evaluating the adequacy of sewer and water systems to accomodate these two projects, analyses were conducted for 1990 and 1995 which included assumptions about other likely developments in the Northern Avenue area.

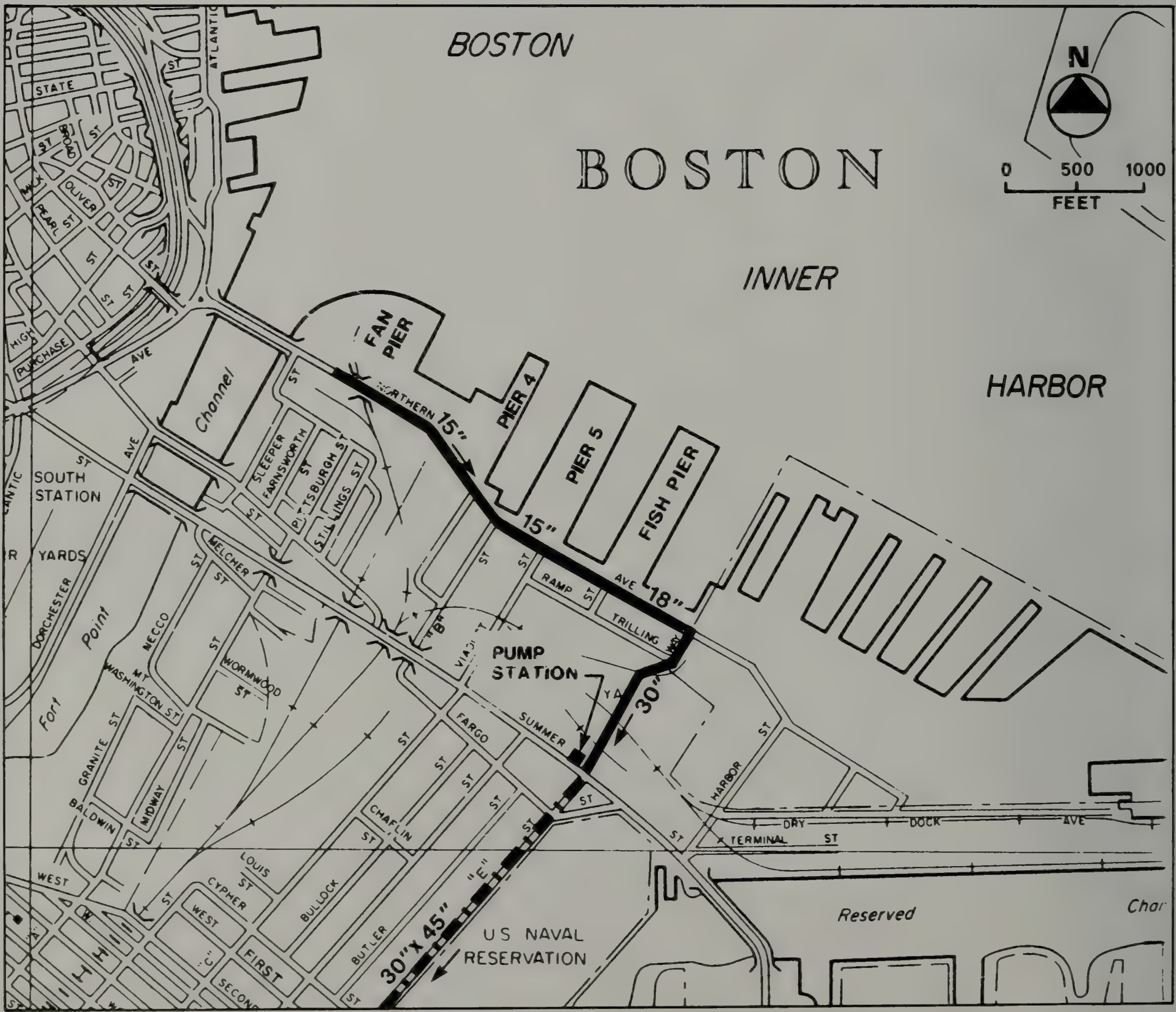
The effects of development on the infrastructure systems considered in this chapter are determined by the square footage of uses planned. Because the maximum programmatic use is reflected in the Initial Proposals for each project, these programs provided the basis for calculations related to infrastructure requirements. Any suggested mitigation measures in this chapter are applicable to both the Initial Proposals and the Lesser-Scale Alternatives.

DESCRIPTION OF THE ENVIRONMENT

■ Sanitary Sewers

The sanitary sewer system serving the Fan Pier and Pier 4 Development sites is operated and maintained by the Boston Water and Sewer Commission (BWSC). This system is shown on Figure VI.2-1. There is a 15-inch sewer in Northern Avenue extending east from the Fan Pier to 50 feet west of Viaduct Street. BWSC has recently checked this sewer and reports it to be in generally good condition except for a low spot in a 200 to 300 foot section near Pier 4.

Figure VI.2-1
Location Plan
Northern Avenue
Sanitary Sewer
System



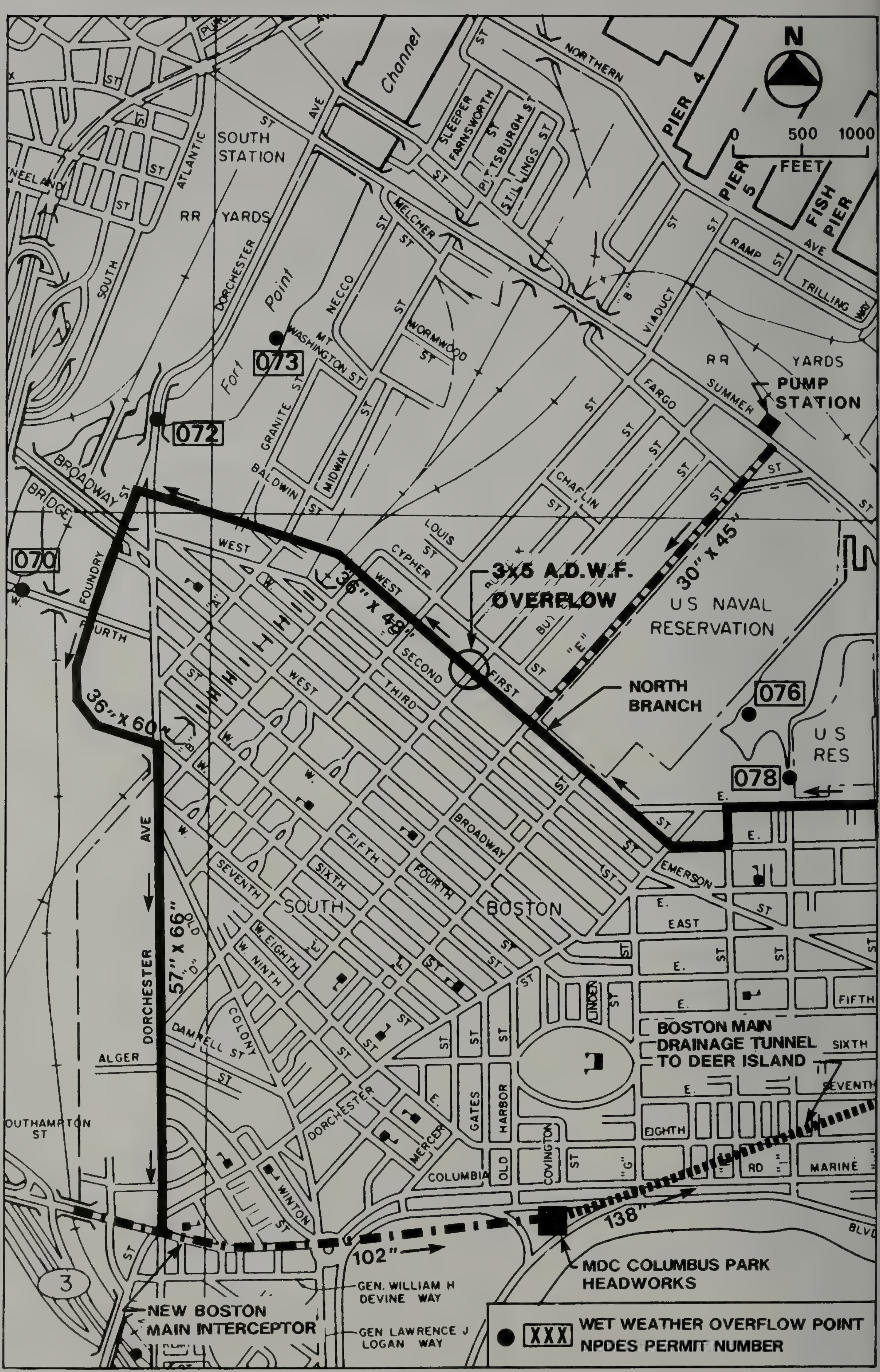
From 50 feet west of Viaduct Street, the sewer becomes an 18-inch diameter pipe that extends approximately 200 feet east of the Trilling Way/Northern Avenue intersection. At Trilling Way, sewage flows into a 24-inch trunk line which proceeds southward, where it joins an 18-inch sewer at a pump station at Summer and "E" Streets. The pump station discharges to a 30-inch x 45-inch sewer in "E" Street which connects to the North Branch of the South Boston Interceptor in West First Street. This Interceptor as shown on Figure VI.2-2 connects directly to the New Boston Main Interceptor which transports flow to the MDC Columbus Park Headworks. Sewage is pumped from the Headworks to the Deer Island Treatment Plant via the 138-inch diameter Boston Main Drainage Tunnel. At Deer Island, sewage receives primary treatment and chlorination before being discharged into the Boston Harbor.

Much of the sanitary sewer system in the vicinity of the project area is currently being replaced. The existing 18-inch sewer from 50 feet west of Viaduct Street to Trilling Way is being replaced by a new 18-inch sewer. In addition, a 30-inch sewer from Trilling Way to the pumping station at Summer and "E" Streets is being installed which will replace the existing 24-inch sewer. A new pumping station is being built at Summer and "E" Streets which will handle flows up to 8.3 million gallons per day (mgd). The construction of the 18-inch and 30-inch sewers is scheduled for completion in December 1985, and the scheduled completion date for the pumping station is February 1986. The current sanitary sewer and pumping station construction in the development area is a combined Massport and BWSC project. BWSC will own these facilities upon construction completion, and BWSC will be responsible for the operation and maintenance of the system. No plans have been initiated by BWSC for the repair or reconstruction of the 15-inch sanitary sewer in Northern Avenue west of Viaduct Street since the level of adjacent development has not been clearly established. However, the joint Massport/BWSC application for the DEQE Collection Systems Program requested funding for pumping station and sewer reconstruction improvements to 50 feet west of Viaduct Street.

Existing Wastewater Flows

O'Brien and Gere, in their November 1982 Preliminary Design Report for BWSC, estimated average daily wastewater flows for the facilities currently discharging to the pumping station at Summer and "E" Streets. In addition, the Preliminary Design Report set forth estimated wastewater flows for future developments, including the Fan Pier and Pier 4 Developments. The following wastewater flow estimates

Figure VI.2-2
Location Plan
South Boston
Interceptor
with Overflow
Points



are taken from this report (Table VI.2-1 summarizes this data).

TABLE VI.2-1 Sanitary System Average (24-Hour) Wastewater Flow Estimates: Existing and Future Development North of Summer St.

Building/ Development Identification	1982 Flows (mgd)	Future Flows (mgd)	Inter-secting Street
NORTHERN AVENUE - WEST OF TRILLING WAY			
Fan Pier	-	0.486	Sleeper St.
CC&F	-	0.26	-
Pier 4	0.044	0.051	-
Topside Club/Rest.	0.006	0.006	-
Arbano & Hamilton	0.001	0.001	-
Fish Processing	0.02	0.02	-
Crocker & Winsor	0.001	0.001	"B" Street
Casey Brothers	0.003	0.01	-
Corenco	0.001	0.001	Viaduct St.
Pier 5 - BOSCOM	0.06	0.271	-
Future BOSCOM	-	0.01	-
Pier Grille	0.001	0.001	-
Pier Transmission	0.001	0.001	-
F.J. O'Hara	-	-	-
Massport-Office	-	-	-
Pier Sheet Metal	-	-	-
Wharf Forging	0.0005	-	-
Fish Pier	0.37	0.38	-
Building No. 5	0.02	0.02	-
Jimmy's Harborside	0.008	0.008	Trilling Way
Sub-Total WEST	0.54	1.53	
NORTHERN AVENUE - EAST OF TRILLING WAY			
EDIC Development	0.2	0.2	Harbor St.
Brilliant Seafood	0.08	0.16	Trilling Way
Sub-Total EAST	0.28	0.36	

Source: O'Brien and Gere. 1982 Preliminary Design Report. Boston Water and Sewer Commission.

TABLE VI.2-1 (cont'd)
Sanitary System Average (24-Hour) Wastewater Flow Estimates: Existing and Future Development North of Summer St.

Building/ Development Identification	1982 Flows (mgd)	Future Flows (mgd)	Intersecting Street
TRILLING WAY - PUMPING STATION			
Caribou Fisheries	0.07	0.07	Northern Ave.
Jimmy's Parking	-	-	-
Bill's Garage	-	-	-
Boston Wynshield	-	-	-
Diesel Engine Sales	-	-	-
Westerbeke Fish Gear	0.0003	-	-
Turner Fisheries	0.02	0.05	Ramp Street
Jimmy's Parking	-	-	-
Commercial Union	0.001	0.002	-
Commonwealth Flats			Haul Road
Phase I	-	0.07	
Phase II	-	0.057	Summer St.
EDIC Development	0.15	0.2	
Sub-Total WAY-STATION	0.24	0.45	
TOTAL Average Flow to Pumping Station	1.06	2.34	

Source: O'Brien and Gere. 1982 Preliminary Design Report. Boston Water and Sewer Commission.

A Santoro's Sub Shop, located on Pier 1, is currently the only source of wastewater flow from the Fan Pier site. O'Brien and Gere did not provide a wastewater flow estimate for this facility, but it is estimated to be relatively small. Pier 4 presently discharges an average daily flow of about 0.044 mgd. Several businesses located on Northern Avenue opposite Pier 4 discharge wastewater at an average rate of approximately 0.028 mgd. The total average daily flow from Pier 4 and these businesses discharging to the 15-inch sewer is about 0.072 mgd. The peak flow to this sewer is thus about 0.203 mgd, assuming a peaking factor of 3.0 for restaurants, and a peaking factor of 2.4 for light industrial/commercial uses. O'Brien and Gere estimates that the total average daily flow to the 15-inch sewer 50 feet west of Viaduct Street is 0.076 mgd (an estimated 4,000 gallons per day (gpd) is contributed by businesses located between "B" and Viaduct Streets). The peak flow is therefore about 0.212 mgd. The total average daily flow to the intersection of Northern Avenue and Trilling Way is about 0.54 mgd, and the peak flow is estimated to be 1.32 mgd. At the intersection of Summer and "E" Streets, the current average daily flow of wastewater is about 0.91 mgd, and the peak is approximately 2.21 mgd. The present average daily wastewater flow to the Summer and "E" Street pumping station is estimated to be 1.06 mgd, and the peak flow would be about 2.57 mgd. Table VI.2-2 presents the 1982 average daily and peak flows, and the capacities of the sanitary sewers tributary to the Summer and "E" Streets pumping station.

TABLE VI.2-2
1982
Wastewater Flows with Sewer System Capacity: North of Summer St.

Location	Sewer Size	Capacity (mgd)	1982 Average Daily Flow (mgd)	1982 Peak Flow (mgd)
Northern Ave. & "B" Street	15"	1.67	0.072	0.203
Northern Ave. & Viaduct Street	15"	1.87	0.076	0.212
Northern Ave. & Trilling Way	18"	3.04*	0.54	1.32
Summer Street & "E" Street	30"	8.00*	0.91	2.21
Summer Street Pumping Station	–	8.3*	1.06	2.57

* Capacities are presented for sewers and pumping station under construction.

System Issues

Combined Sewer Overflows. The discharges from combined sewer overflows into the Harbor are a source of pollution during heavy rain storms. However, dry weather discharges also occur at certain combined sewer outfalls. In general, dry weather discharges are caused primarily by infiltration and inflow (I/I), insufficient system capacity, tidal waters entering the system and pumping failures at the Deer Island Treatment Plant.

There are neither combined sewers nor combined sewer outfalls/overflows in or near the project areas. BWSC has indicated that sewage overflows do occur in the sewer system where there are combined sewers, namely south of the Summer Street Pump Station, including the North Branch of the South Boston Interceptor.

The February 1985 Final Draft Facility Study prepared by Metcalf & Eddy, Inc. for BWSC indicates that flow rates up to two and one-half times the average dry weather flow do not result in overflows along the North Branch of the South Boston Interceptor. When carrying three and one-half times the average dry weather flow, the Interceptor surcharges just upstream of the "A" Street siphon and an overflow occurs at the regulator located at "D" and First Streets. The BWSC has not recorded any overflow occurrences at this regulator for any dry weather event since March, 1980. A profile of the interceptor at this flow rate of three and one-half times the average dry weather flow, as prepared by Metcalf & Eddy, is shown on Figure VI.2-3. In their Project Information Form submitted to DEQE in December 1982, O'Brien and Gere identified several wet weather overflow points along the North Branch. Figure VI.2-2 shows the locations of these overflows. Overflow occurrences may be reduced if the North Branch of the South Boston Interceptor is cleaned (the Metcalf & Eddy Study reported deposition in the sewer ranging from 5 inches to 35 inches in depth). BWSC is planning to clean the South Boston Interceptor beginning in the Spring of 1986.

Boston Harbor Clean-Up. The Massachusetts Water Resources Authority (MWRA) was created in 1984 to assume the water and sewer responsibilities of the Metropolitan District Commission. The harbor clean-up effort is currently undergoing a comprehensive review and assessment by the MWRA in order to establish a priority of corrective actions. Actions currently being evaluated include:

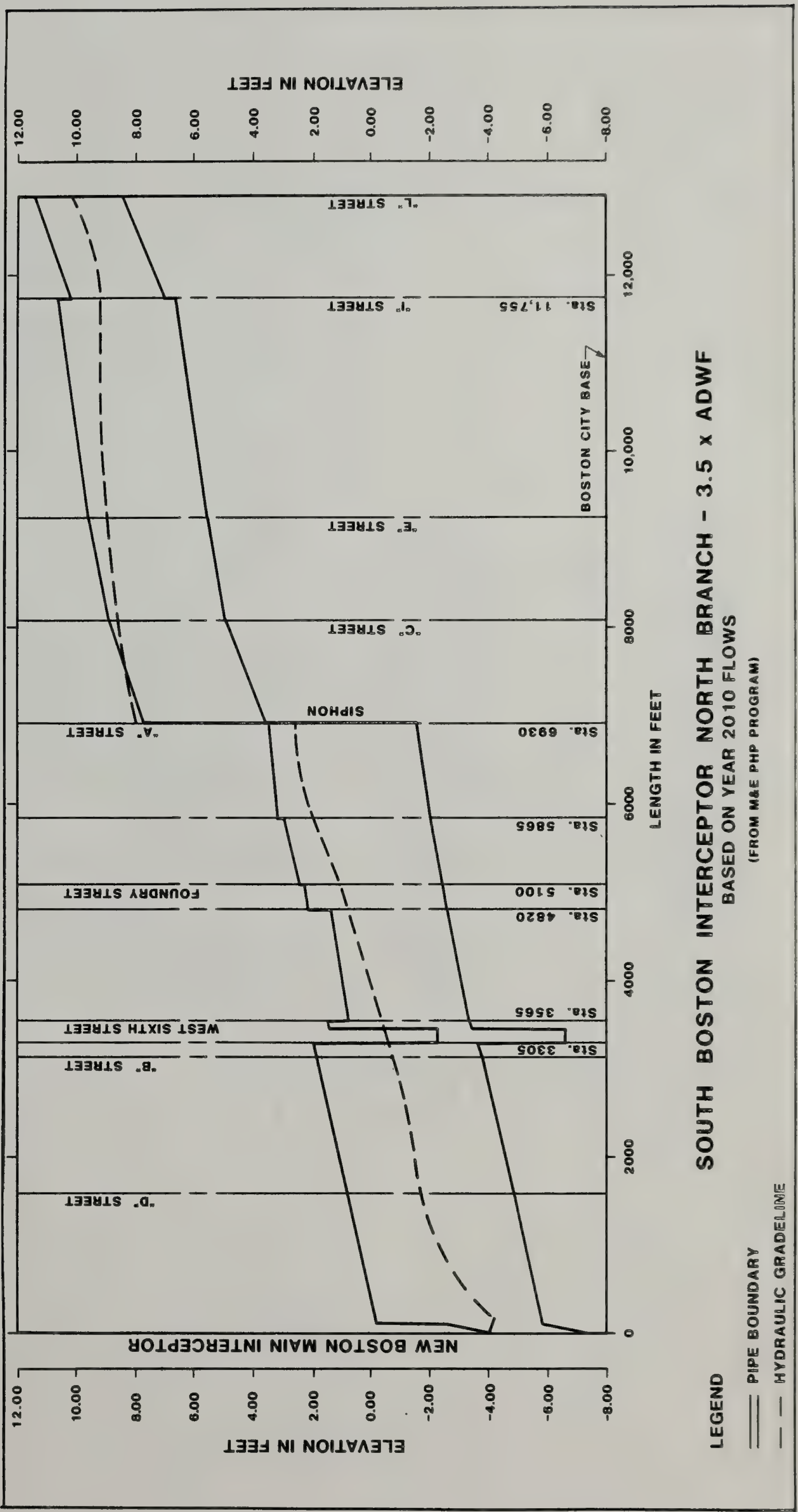
- Construction of secondary wastewater treatment plant at Deer Island.
- Elimination of sludge disposal in Boston Harbor.
- Correction of combined sewage overflows (CSO) into Boston Harbor. The MWRA and BWSC each have CSO correction programs whose first priority is the clean-up of beaches and other recreational use areas.
- Implementation of the on-going industrial pretreatment program. The installation of pretreatment facilities and changes in industry processing will reduce heavy metal and toxic chemical discharges into Boston Harbor from treatment plant effluent and sludge disposal, and from combined sewage overflows.

■ Storm Drainage

The Fan Pier site currently does not have a storm drainage system. All drainage is by overland flow to Boston Harbor and the Fort Point Channel.

The Pier 4 site has several storm drainage systems. Pier 4 between Northern Avenue and the Pier 4 Restaurant

FIGURE VI.2-3
South Boston
Interceptor
North Branch
3.5 x Average
Dry Weather
Flow



is served by a series of catch basins or drains which discharge directly to Boston Harbor either under the Pier or through the easterly stone sea wall. The remainder of the site from Pier 4 westerly to approximately the angle point in the Northern Avenue northerly street line (project division line) is drained by a catch basin system with storm drain pipe varying in size from 8-inch to 30-inch. The 30-inch outfall to Boston Harbor is located approximately 300 feet northerly of the angle point in the Northern Avenue northerly street line, and is within the Pier 4 site.

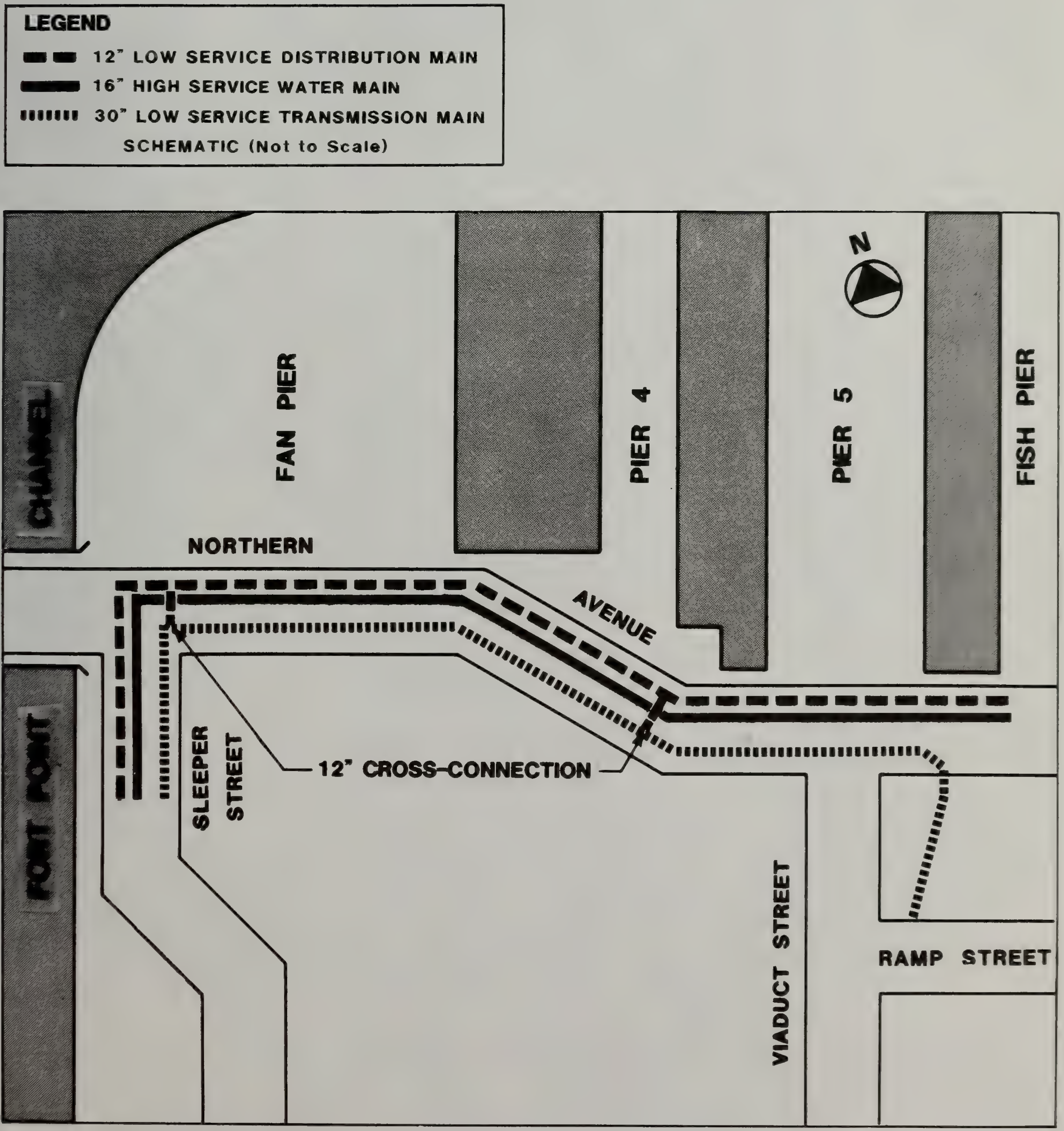
The BWSC does not have a storm drainage system in Northern Avenue from "B" Street westerly to Sleeper Street and the Fort Point Channel. However, there are remnants of two small systems of unknown ownership in several portions of Northern Avenue. One system has catch basins on the north and south sides of the street between Pier 1 and Pier 2. No discharge point for these catch basins has been identified. The second system drains the north and south sides of the street approximately 100 feet westerly of the angle point in the Northern Avenue northerly street line; this storm drainage system discharges to the catch basin system west of Pier 4, described above. In addition to these two small systems, there are two catch basins in the Northern Avenue north gutter located approximately halfway between Pier 4 and the angle point in Northern Avenue. These discharge to the catch basin system west of Pier 4.

■ Water Supply System

Water for domestic use and fire protection is supplied to the project area by the BWSC. Three major water systems serve the Fan Pier and Pier 4 Development sites--two low service mains for domestic water supply and a high service main for fire protection. All three systems are located in Northern Avenue as shown on Figure VI.2-4.

The low service distribution main that supplies domestic water to the project area is a 12-inch main in Northern Avenue. The distribution main is supplied by a 30-inch low service transmission main also in Northern Avenue. The 12-inch low service distribution main increases to a 16-inch low service distribution main near Pier 5, and provides domestic and fire supply to existing commercial and light industrial properties all along Northern Avenue from the Fort Point Channel to the Boston Marine Industrial Park. The distribution main also reduces to 8-inch in Sleeper Street to a point approximately 350 feet south of Northern Avenue where it increases to 12-inch toward Congress Street. The low service water main system which serves this area of South Boston is shown on Figure VI.2-5.

Figure VI.2-4
Location Plan
Northern Avenue
Water Supply
System



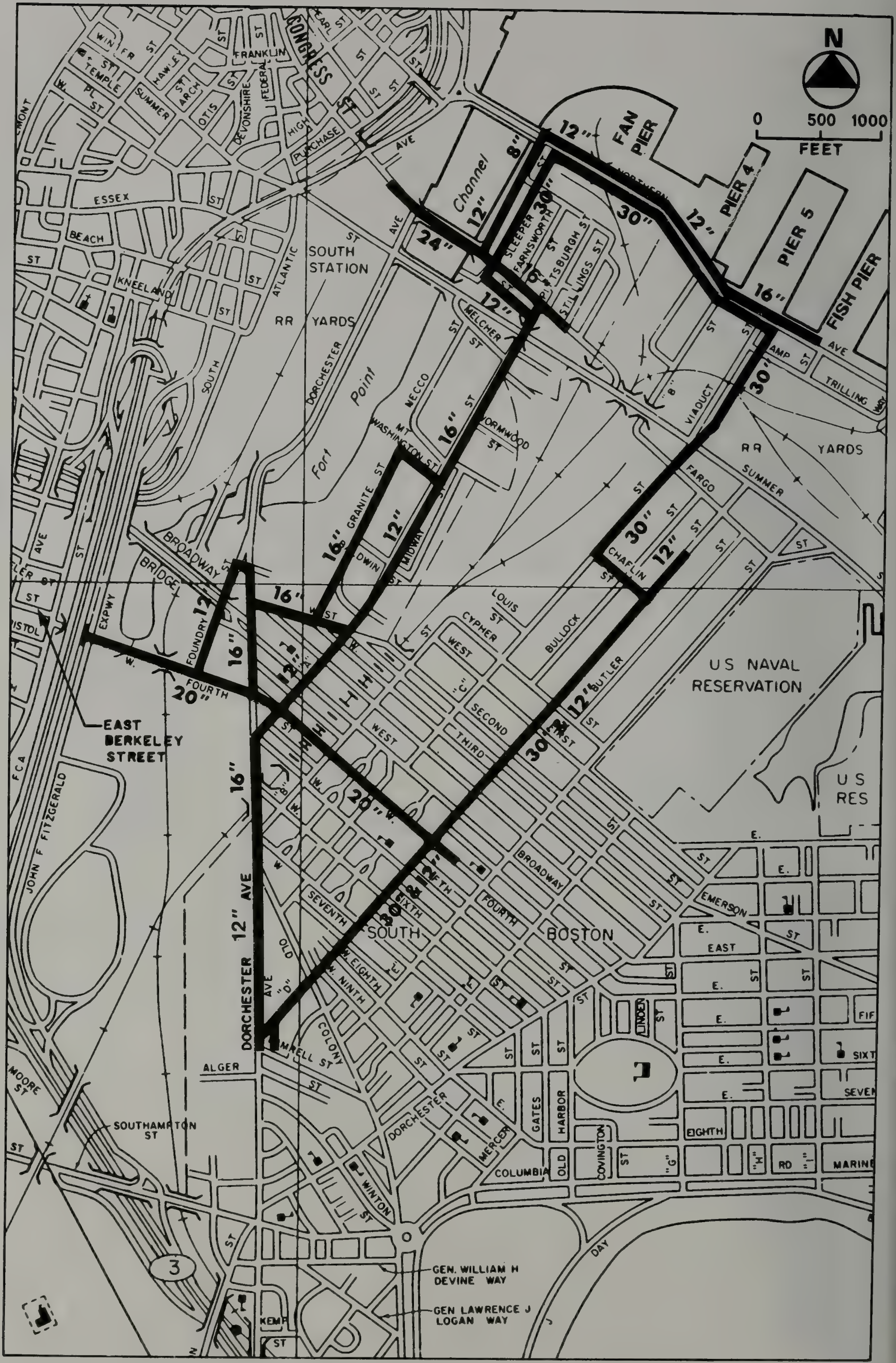


Figure VI.2-5
Location Plan
Low Service
Water Supply
System

The low service system which provides domestic supply consists of a 12-inch cast iron pipe installed around 1909, and a 30-inch cast iron pipe transmission main also installed around 1909 but cleaned and cement lined in 1971. These two mains are cross-connected at various points in the system with two cross-connections being in the vicinity of the Fan Pier and Pier 4 Developments. The 30-inch transmission main would be expected to be in good condition because it was cleaned and cement lined in 1971. On the other hand, the 12-inch main and the cross-connections to the 30-inch transmission main could be in a deteriorated condition from possible tuberculation over the 76 years it has been in service.

BWSC water system maps indicate the existence of a series of 6-inch water mains running along the perimeter of Piers 1, 2 and 4. These lines are connected to the low service water system along Northern Avenue. The system maps indicate the 6-inch pipes serving the Fan Pier and the area across from the Fan Pier (old railroad yard) have been cut off from service by a closed valve in the water main near Pier 4. The age or condition of these 6-inch pipes is not known.

The high service water supply system has a 16-inch main running parallel to the 12-inch and 30-inch low service mains in Northern Avenue. The high service main supplies fire hydrants along Viaduct Street, fire protection to properties along Northern Avenue and domestic water to the Boston Fish Pier. The 16-inch high service main in the area was installed around 1931. In 1983, BWSC replaced an 8-inch high service main in a portion of Sleeper Street with 16-inch pipe to make the development area completely looped with a 16-inch main. The high service water main system which serves this area of South Boston is shown on Figure VI.2-6.

■ Energy

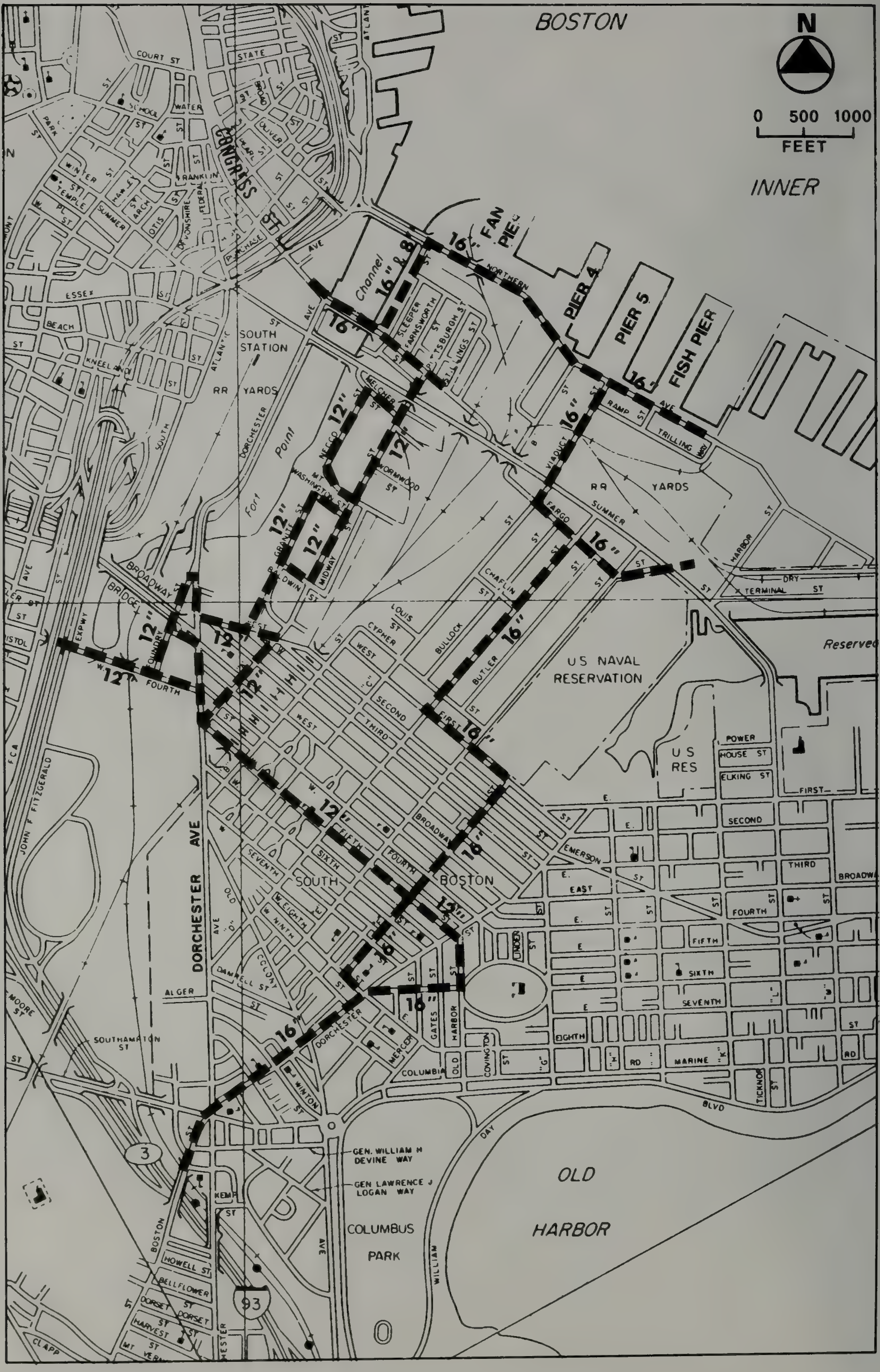
Electricity

The Boston Edison Company presently has two electric supply systems in Northern Avenue adjacent to the Fan Pier and Pier 4. A duct/manhole system in the northerly half of the roadway was installed many years ago to furnish electrical power for the warehousing facilities of the New York, New Haven and Hartford Railroad located on both sides of Northern Avenue, and also to furnish electricity for the street lighting system. A 115 KV system in the center of the roadway was installed in the mid-1970's.

Gas

There is an existing Boston Gas Company 12-inch gas main in the northerly half of the Northern Avenue roadway

Figure VI.2-6
Location Plan
High Service
Water Supply
System



adjacent to the development sites. It was installed in 1924. Anthony's Pier 4 Restaurant is the only major user along Northern Avenue between "B" Street and Sleeper Street.

■ Telecommunications

The New England Telephone Company does not have an underground duct/manhole system in Northern Avenue adjacent to the development sites; all service west of "D" Street to the Sleeper Street area is furnished by overhead wires on utility poles.

■ Fire Alarm

Boston Fire Alarm Division of the Boston Fire Department has existing facilities in Northern Avenue adjacent to the development sites. The Pier 4 Restaurant presently has a fire alarm box in operation.

PROBABLE PROJECT IMPACTS

The proposed Fan Pier and Pier 4 projects will create increased demands for utility services for both project sites, as compared to existing conditions. Estimates of these increased demands and their impacts on the current infrastructure system are discussed below.

■ Sanitary Sewers

Projects' Wastewater Generation

The average daily quantity of wastewater to be generated by the Fan Pier Development has been projected at 0.489 mgd. The projected average daily wastewater flow estimate for Pier 4 is 0.328 mgd. The total average daily quantity of wastewater generated by both Developments is thus 0.817 mgd. The total peak wastewater flow estimate from the two sites is about 1.50 mgd. These projections are shown in Table VI.2-3 and are based on the Title V standards of the Massachusetts Department of Environmental Quality Engineering Sanitary Code. Peaking factors of 3.0, 2.4 and 1.5 were assumed for restaurants, light industrial/commercial, and residential/hotel categories, respectively for the two sites.

TABLE VI.2-3 Projected Wastewater Flow Estimates: Fan Pier and Pier 4 Year 1995

	Average Daily (mgd)	Peak (mgd)
Fan Pier	0.489	0.881
Pier 4	0.328	0.620
Project Total	0.817	1.501

Actual flows generated by the Fan Pier and Pier 4 Developments may be somewhat less than the estimates presented in Table VI.2-3. The average daily flows presented here and elsewhere in this Section are based largely on Title V Sewage Flow estimates, which more closely approximate maximum daily flows, rather than average daily quantities. Also, it is anticipated that some flow reduction will be achieved by the installation of water conservation devices described under the section "Mitigation Measures" in this Draft EIR.

The Fan Pier site is currently used for warehousing and at-grade parking. A Santoro's Sub Shop on Pier 1 produces the only wastewater flow from the site. Given the O'Brien and Gere estimate that the existing Anthony's Restaurant on Pier 4 generates an average daily wastewater flow of approximately 0.044 mgd, and considering a relatively small wastewater flow from the Santoro Sub Shop, the total flow generated by the two projects represents an average daily increase of about 0.773 mgd over present conditions.

In addition to the wastewater flows presented herein, floor drainage from the garages in the Fan Pier and Pier 4 Developments will also be directed to the sanitary sewer system. It is anticipated that this drainage will flow by gravity to one or more structures for gas, oil and grease separation, and then to a wetwell prior to being pumped to the sanitary sewer system.

An allowance for typical infiltration rates of 300 gpd/inch diameter/mile of sewer for new sewers, and 500 gpd/inch diameter/mile of sewer for existing sewers, should also be accounted for in assessing the capacity of the existing sewer system. Using these estimates, about 6000 gpd of infiltration would reach the Summer and "E" Street pumping station.

Adequacy of Sewer System

The sanitary sewer systems for both developments will connect into the existing 15-inch sewer pipe which runs along existing Northern Avenue. The Fan Pier and Pier 4 Developments will each have wetwells with pumping facilities to contain wastewater flows and garage floor drainage. These wetwells are needed because the garage floor drainage and portions of the sanitary flows originate below the invert level of the 15-inch sewer in Northern Avenue. The contents of the wetwells will be pumped to the sewer periodically throughout the day. The wetwell capacities will correspond to the volume required to contain the peak flow rate for one hour from each development.

In order to assess the capacity of the sewer system to accommodate wastewater flows from the Fan Pier and Pier 4, estimated flows from these developments were added to estimated future flows from existing land uses in the Northern Avenue area (derived from the 1982 Preliminary Design Report, Table VI.2-1. These total flows were then compared to sewer capacity. Table VI.2-4 presents the estimated future average and peak wastewater flows tributary to the Summer and "E" Streets pumping station. Except for the Fan Pier Development and Pier 4 Development, the peak flows were derived from the future average daily flows for existing development from the 1982 Preliminary Design Report by O'Brien & Gere (see Table VI.2-1) multiplied by the peaking factors mentioned above. The average daily flows used for the Fan Pier and Pier 4 are taken from Table VI.2-3.

TABLE VI.2-4 Wastewater Flows and Sewer System Capacity: Fan Pier, Pier 4, and Existing Development North of Summer St.

Location	Sewer Size	Capacity (mgd)	Future Average Daily Flow (mgd)	Future Peak Flow (mgd)
Northern Ave. & "B" St.	15"	1.67	0.845	1.57
Northern Ave. & Viaduct St.	15"	1.87	0.856	1.60
Northern Ave. & Trilling Way	18"	3.04*	1.54	3.24
Summer St. & "E" St.	30"	8.00*	2.02	4.40
Summer St. Pumping Station	-	8.3*	2.22	4.88

* Capacities are presented for sewers and pumping station currently under construction.

Table VI.2-4 indicates that existing development north of Summer Street, in combination with the Fan Pier and Pier 4 Developments, will result in no significant surcharging of sewers during peak flow periods. Minor surcharging may occur in the 18-inch sewer on Northern Avenue when peak flows are present. Allowances for infiltration and garage floor drainage are not included in Table VI.2-4, but should not cause a significant increase in the flow estimates (about 0.01-0.02 mgd).

The sewer capacity analysis presented in Table VI.2-5 is based upon the same assumptions used to compile the data in Table VI.2-4, except that estimated wastewater flows for Fan Pier and Pier 4 are added to those for all future development north of Summer Street (as per the 1982 Preliminary Design Report, Table VI.2-1).

TABLE VI.2-5 Wastewater Flows and Sewer System Capacity: All Future Development North of Summer St.

Location	Sewer Size	Capacity (mgd)	Future Average Daily Flow (mgd)	Future Peak Flow (mgd)
Northern Ave. & "B" St.	15"	1.67	1.11	2.20
Northern Ave. & Viaduct St.	15"	1.87	1.12	2.22
Northern Ave. & Trilling Way	18"	3.04*	1.81	3.89
Summer St. & "E" St.	30"	8.00*	2.42	5.35
Summer St. Pumping Station	-	8.3*	2.62	5.83

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* Capacities are presented for sewers and pumping station currently under construction.

Table VI.2-5 indicates that if all future development north of Summer Street were to occur (including Fan Pier and Pier 4 Developments), the existing 15-inch sanitary sewer in Northern Avenue west of Viaduct Street would experience some surcharging during peak flow occurrences. It also appears that the 18-inch sewer under construction on Northern Avenue between Viaduct Street and Trilling Way would experience surcharging during peak flow periods. However, the 30-inch sewer under construction on Trilling Way, and the pumping station at Summer and "E" Streets appear to have sufficient capacity to transport the peak wastewater flows from the Northern Avenue/Commonwealth Flats area.

As presently planned, the Fan Pier and Pier 4 Developments will be constructed in phases, with both projects completed by 1995. For this Draft EIR, the year 1990 has been established as a mid-project impact assessment point for each development. The following uses are planned for completion by 1990 as shown in Table VI.2-6.

TABLE VI.2-6 Uses for Fan Pier and Pier 4 Developments Year 1990

Use	Fan Pier	Pier 4	Total
Office	547,000 S.F.	225,000 S.F.	772,000 S.F.
Retail	15,000 S.F.	55,000 S.F.	70,000 S.F.
Residential	230 units	150 units	380 units
Hotel	900 rooms	250 rooms	1,150 rooms

Using Title V generation rates, average 1990 wastewater flows from the Fan Pier are estimated to be 0.242 mgd. Average 1990 wastewater flows from Pier 4 are estimated to be 0.155 mgd.

Table VI.2-7 presents the sewer capacity analysis for the 1990 developments at Fan Pier and Pier 4. Estimated flows from these developments are summed with future flows from existing development (see Table VI.2-1). Other assumptions concerning flows and peaking factors are the same as those used in Tables VI.2-4 and VI.2-5.

TABLE VI.2-7 Wastewater Flows and Sewer System Capacity: Fan Pier, Pier 4, and Existing Development North of Summer St. Year 1990

Location	Sewer Size	Capacity (mgd)	Future Average Daily Flow (mgd)	Future Peak Flow (mgd)
Northern Ave. & "B" Street	15"	1.67	0.425	0.816
Northern Ave. & Viaduct St.	15"	1.87	0.436	0.842
Northern Ave. & Trilling Way	18"	3.04*	1.12	2.48
Summer St. & "E" St.	30"	8.00*	1.60	3.64
Summer St. Pumping Station	-	8.3*	1.80	4.12

* Capacities are presented for sewers and pumping station currently under construction.

Table VI.2-7 indicates that in 1990 there will be no peak period surcharging of sewers, and that there is reserve sewer capacity for other developments that might occur in this area.

The developers will continue to coordinate efforts with the BWSC, MDPW and BRA for planning sanitary sewer improvements in existing and Relocated Northern Avenue.

Combined Sewer Overflows

The North Branch of the South Boston Interceptor receives wastewater from the Summer and "E" Streets pumping station. The Interceptor is of sufficient capacity, if clean, to carry 2.5 times the average dry weather sewage flow (ADWF) projected for the year 2010. At 3.5 times the ADWF, an overflow occurs at the regulator located at "D" Street and West First Street (see Figure V1.2-2). This was reported by Metcalf & Eddy in their February 1985 Final Draft Facility Study for BWSC. Metcalf & Eddy also showed average and peak dry weather flows for the Interceptor of 7.34 mgd and 12.13 mgd, respectively, in the year 2010. This ratio of peak to average dry weather flow is about 1.65. Since this ratio is less than 3.5, no overflows along the Interceptor should occur during dry weather. Furthermore, the increase in flow to this Interceptor from the Fan Pier and Pier 4 Developments, even if not accounted for by the Metcalf & Eddy study, should not cause overflows to occur during dry weather. During wet weather conditions which cause flows to meet or exceed 3.5 times the ADWF, some wastewater flow will be contributed to the overflow by the Fan Pier and Pier 4 Developments.

The volume and/or increase in rate of overflow due to the Fan Pier and Pier 4 Developments has not been determined. To properly assess the situation, further examination is needed to determine the physical dimensions of the overflow regulator structures and the hydraulic gradelines at peak flow. This data will be obtained and analyzed for the Final EIR for this project.

■ Storm Drainage

All drainage from the Development sites' roadway circulation systems, paved parking areas, roof drains, and pedestrian and landscaped areas will be discharged to the Boston Inner Harbor. Discharge of gas, oil and grease into the Harbor will be prevented by gas/oil separator structures constructed as part of the Developments. Sidewalks along Northern Avenue will drain to the street storm drainage system.

Northern Avenue adjacent to the Development sites is presently drained by the remnants of two small drainage systems at the Fan Pier and Pier 4. The planning underway for the reconstruction of existing Northern Avenue includes the narrowing of the roadway pavement which would require new catch basins served by a storm drainage system. The Northern Avenue reconstruction is a proposed Massachusetts Department of Public Works (MDPW) Urban Systems Project to be designed by the Boston Redevelopment Authority. This Urban Systems Project is related to the MDPW Relocated Northern Avenue Bridge project to be designed by the MDPW.

The U.S. Environmental Protection Agency (EPA) is proposing to implement a storm water regulation program as part of the National Pollutant Discharge Elimination System (NPDES) Permit Regulations. On March 7, 1985, EPA published a Notice of Proposed Rulemaking which proposed to amend the final storm water regulations published on September 26, 1984. The comment period for the NPDES Storm Water Point Sources regulations has been extended to November 12, 1985 as published in the September 17, 1985 Federal Register. Final regulations will not be available until sometime after the comment period closing. Impacts of these regulations upon the development sites' storm drainage systems will be evaluated following publication of the final regulations.

■ Water Supply System

Project Water Demand

Demand for domestic water to be generated by the Fan Pier and Pier 4 Developments has been projected at 964,800 gpd or 670 gallons per minute (gpm) average daily rate and 1,785,600 gpd peak rate. This estimate is based upon the DEQE Title V Sanitary Code wastewater flow calculations, increased by approximately 18 percent to account for consumptive water use: human use, process water, irrigation, cooking and other miscellaneous uses. Water demand is presented in Table VI.2-8.

TABLE VI.2-8 Projected Water Demand Rates Low Service System: Fan Pier and Pier 4 Year 1995

	Average Daily		Peak	
	(gpm)	(gpd)	(gpm)	(gpd)
Fan Pier Dev. (3.4 Mil. S.F.)	400	576,000	740	1,065,600
Pier 4 Dev. (1.7 Mil. S.F.)	270	388,800	500	720,000
Project Total	670	964,800	1,240	1,785,600

Table VI.2-8 indicates that the low service system flows needed to service the proposed Fan Pier and Pier 4

Developments are at an average daily flow rate of 670 gpm and a peak rate of 1240 gpm. These values include the flows generated by the existing Anthony's Pier 4 Restaurant according to the 1982 O'Brien and Gere Study. Therefore, the incremental demand for water due to site development is estimated at an average daily flow rate of 915,120 gpd, or about 635 gpm.

Adequacy of Water System

The average daily demand shown in Table VI.2-8 would be adequately supplied to the site based on computations of field data for a hydrant discharge test performed by BWSC in December 1984 on the low service system near the intersection of Melcher Street and "A" Street. This hydrant discharge test was performed on the distribution main at the intersection of Melcher Street and "A" Street which indicated a low service system capacity of 7230 gpm at a system residual pressure of 20 psi. The data from this discharge test was used to estimate the available system capacity for the low pressure service at the Fan Pier and Pier 4 Developments sites. Computations for the system capacity at the development sites was estimated to be 4,200 gpm at a system residual pressure of 20 psi. This indicates that the maximum water demand for the Fan Pier and Pier 4 Developments can be adequately supplied by the low pressure water system. At the peak demand rate of 1240 gpm, system residual pressure would be decreased to about 54 psi.

The low service system piping serving this area is very old, but renovations have been performed in recent years such as cleaning and cement lining of the 30-inch transmission main in 1971 and the replacement of a smaller main in Sleeper Street in 1983. Based on the configuration of the entire piping system network serving the development area, it would be reasonable to expect that the distribution system could deliver to the Sleeper Street and Northern Avenue area adequate water for the Fan Pier and Pier 4 Developments.

As discussed above, the Fan Pier and Pier 4 Developments are to be constructed in phases with both projects finished in 1995. To estimate the mid-project 1990 water demands, the same set of development assumptions were used as those analyzed under "Adequacy of Sewer System". In 1990, the estimated average daily demand by the Fan Pier on the low service system would be approximately 198 gpm. The average daily demand for the Pier 4 project would be approximately 127 gpm. The total Fan Pier and Pier 4 average daily demand would then be approximately 325 gpm, with a peak demand of approximately 598 gpm. Based on the December 1984 hydrant discharge flow test at Melcher Street and "A" Street, the low service system residual pressure would be about 56 psi during the peak demand period. This indicates that there is adequate residual pressure in the low service system for the 1990 mid-project development.

The high service system flows needed for the proposed Fan Pier and Pier 4 Development sites are based on expected building heights, floor areas, materials, occupancy, and the sprinkler systems to be used. Based on the hydrant flow test performed in the area of "A" Street and Summer Street by BWSC in July, 1983, the high service system capacity was estimated to be approximately 3,700 gallons per minute at a residual pressure of 20 psi. The needed fire flow has been estimated to be about 3500 gpm for these developments. The reliability of the sprinkler systems for the Fan Pier and Pier 4 Developments can be increased with the installation of division gates between the low and high service water systems in Northern Avenue; fire flows from the high service main could be augmented from the low service main by opening the division gates. The developers will consult with the City Fire Marshal and the BWSC to insure that the supplies are adequate for the needed fire flows.

The BWSC has indicated that Camp, Dresser & McKee, Inc. is currently working on a city-wide water system study which is scheduled to be completed in late 1986. The Northern Avenue area in South Boston is not included within the system study area. However, BWSC is anticipating that 16-inch low and high service water mains will be installed in Relocated Northern Avenue in conjunction with the Massachusetts DPW (MDPW) Relocated Northern Avenue Bridge Project. The extent of water main replacement work in existing Northern Avenue as part of the related Boston Redevelopment Authority's (BRA) Urban Systems Project is not known at this time. The relationship of these proposed improvements to the water supply system for the Fan Pier and Pier 4 Developments will be further evaluated in the Final EIR. The developers will continue to coordinate efforts with the BWSC, BRA, MDPW and the Boston Fire Department.

■ Energy

Electricity

The two existing electric supply systems in Northern Avenue will not be of sufficient capacity to support the anticipated electrical loads of either the Fan Pier and Pier 4 sites or the additional development in the Northern Avenue/Commonwealth Flats area in South Boston according to the Boston Edison Company. The electrical loads projected for the Fan Pier and Pier 4 Developments include the possibility of heating, cooling, hot water, cooking, lighting and other electrical requirements. Even if space heating is fueled by gas or oil, the remaining cooling, hot water, cooking, lighting and other electrical demands could not be adequately supplied by the existing electrical infrastructure.

Boston Edison anticipates that a new power source will have to be brought into the Northern Avenue area to furnish the electricity needs to the future development sites. In addition, if future developments are to be heated electrically, two new duct/manhole systems and a new substation would be required. If the developments are not electrically heated, Boston Edison still anticipates a substation installation in order to furnish power to the adjacent Commonwealth Flats development area southerly of Northern Avenue to Summer Street and easterly to the Boston Marine Industrial Park. A minimum size land parcel of 10,000 square feet would be required for a substation location within the Northern Avenue/Commonwealth Flats area. The developers will continue to coordinate efforts with the Boston Edison Company.

Gas

The Boston Gas Company will not be capable of supplying the anticipated gas loads to the Fan Pier and Pier 4 Development sites nor the entire Northern Avenue/Commonwealth Flats area in South Boston utilizing the existing 12-inch gas main in Northern Avenue. The gas loads would include cooling, hot water, cooking and heating requirements. The existing 16-inch intermediate pressure (I.P.) gas main in Northern Avenue between the Boston Marine Industrial Park and "D" Street would need to be extended westerly to the development sites to supply these anticipated gas loadings. The developers will continue to coordinate efforts with the Boston Gas Company.

■ Telecommunications

Northern Avenue adjacent to the Fan Pier and Pier 4 Development sites is presently provided with telephone service utilizing overhead wires on utility poles. New England Telephone anticipates that the sites will be served by installation of an underground duct/manhole system. One alternative currently being evaluated by New England Telephone is a systems installation from its existing facility at Congress and Farnsworth Streets utilizing either conventional wiring or fiber optic capability. The upgrading plans will consider not only the Fan Pier and Pier 4 sites but also the entire Northern Avenue/Commonwealth Flats area in South Boston. The developers will continue to coordinate efforts with New England Telephone.

■ Fire Alarm

Boston Fire Alarm Division has stated that the existing fire alarm facilities in Northern Avenue are adequate to serve the development sites. The only possible impact could be a short-term interruption of service resulting from the physical connection of the fire alarm systems from the sites into the Fire Alarm facilities in

Northern Avenue. The developers will continue to coordinate efforts with Boston Fire Alarm.

MITIGATION MEASURES

In an effort to mitigate adverse impacts of the Developments upon the existing sanitary sewer, water supply, storm drainage, energy, fire and telecommunications systems, the developers will continue to coordinate with BWSC and the utility companies. Regardless of which systems are adopted, the following measures will be employed to prevent and mitigate potentially adverse effects of the proposed Developments on the surrounding infrastructure system.

■ Sanitary Sewers

Several mitigation measures will be used to minimize adverse effects associated with sewage generation. Grease traps that meet DEQE Title V Sanitary Code requirements will be provided in all restaurant kitchen facilities, and they will be maintained according to BWSC regulations.

In accordance with the State Building Code, water conservation devices, such as low-flow toilets and flow restricting faucets and shower heads, will be used to reduce the quantity of sanitary wastewater discharged from the developments.

As previously mentioned, there are neither combined sewers nor combined sewer overflows within the development areas. However, the North Branch of the South Boston Interceptor, which conveys wastewater from the development areas, does have combined sewer overflow locations. BWSC is planning to clean the North Branch of the South Boston Interceptor in the Spring of 1986. It is anticipated that removal of the deposition in this interceptor will reduce the number of overflow occurrences experienced along this sewer.

A proposed combined sewage overflow treatment facility for overflows into Fort Point Channel and Boston Harbor is high on the Extended Portion of the Fiscal Year 1986 Massachusetts Construction Grants Project Priority List. This MWRA facility together with the proposed South Boston CSO Consolidation Pipeline will intercept and provide primary treatment for certain overflows along and tributary to the North Branch of the South Boston Interceptor.

■ Water Supply System

In accordance with the State Building Code, water conservation devices, such as low-flow toilets and flow restricting faucets and shower heads, will be used to reduce the water demand on the low service water system.

■ **Storm Drainage**

Surface drainage from the interior roadway circulation systems, paved surface parking areas, and pedestrian and landscaped areas within the Development sites will be discharged to the Inner Harbor. Gas and oil separators, with proper venting, will be constructed in each storm drain to minimize discharge of these materials to the Harbor. Roof drains and the cooling/circulation waters from buildings will be discharged into the Harbor in accordance with applicable local, State and Federal (EPA) regulations.

■ **Energy and Telecommunications**

Measures to mitigate adverse impacts due to the installation of the electric, gas and telephone systems to service the development sites will include:

- Coordinated facilities planning with utilities' providers.
- Installation of utilities underground to improve visual quality.
- Incorporation of energy conservation into project design and operation.
- Reduction of fugitive dust emissions through good construction practices.
- Coordinated scheduling of construction activities to minimize traffic disruptions and interruption of utility service.

■ **Fire Alarm**

New fire alarm facilities will not be required in Northern Avenue. There are no adverse impacts associated with the fire alarm system other than minimal time required to connect the alarm systems for the two sites into the Boston Fire Alarm facilities in Northern Avenue.

Construction and Operations Issues

Construction

INTRODUCTION

This section describes the construction techniques under consideration for the Fan Pier and Pier 4 Developments at this stage of master planning. Given the special characteristics of these two projects and their sites, planning for the construction will evolve in response to increased definition of project design, phasing, and timing. The probable short-term environmental impacts of construction are analyzed in greater detail elsewhere in Chapters IV, V, and VI. Programmatic data for the two developments and their alternatives is presented in Chapter III.

DESCRIPTION OF THE PROJECTS

■ No-Build Alternative

In the event that neither the Fan Pier nor Pier 4 are developed, most of the construction-related effects described in this section will not occur. The sites would remain in their current use and ownership. Repairs to portions of the seawall and pier structures will be needed to avoid unsafe conditions. In particular, the seawall on the east side of the Fan Pier will need structural supports. This work could entail the placement of rip-rap on the water side of the seawall, necessitating truck trips to the Fan Pier site (carrying stone rip-rap) and operation of heavy equipment on the site. Possible impacts of this work could include traffic, noise, and air and water quality effects. Necessary mitigation measures would be implemented to minimize adverse effects.

■ Fan Pier Development

Construction is anticipated to begin on the Fan Pier project in fall, 1986. For purposes of this assessment of construction impacts, there are no significant differences between the Initial Proposal and the Lesser-Scale Alternative.

Phase I

Construction for Phase I is anticipated to last approximately 3 1/2 years, with completion scheduled for the spring, 1990. Current plans for the first phase of the project entail construction of the elements listed below:

Buildings

- Hyatt Hotel - 900 rooms
- Office - 547,000 s.f.
- Retail - 15,000 s.f.
- Residential - 230 units
- Underground parking for all uses north of the canal

Site Amenities and Infrastructure

- Site roadways, curbs and sidewalks
- Canal and bridges
- Public open spaces, walkways, and the Fan Pier portion of Harborwalk
- Sewers, storm drainage facilities, water supply, electricity, gas, and telecommunications facilities
- Fire protection facilities for Phase I structures

Water-Related Facilities

- Western breakwater at entry to the marina
- The marina (approx. 80 slips)
- Docking and landside support facilities for possible use by a cultural/commuter boat (if feasible), commuter boats, and airport shuttles
- Floating docks along the north side of the canal
- Repair of failing seawalls, particularly on the east side of Fan Pier facing the marina
- Dredging of the marina for improved marine access

Subsequent Phases of Construction

Current construction plans do not specify the timing or scope of construction phases after Phase I. Such work is expected to be finished by 1995 and would include completion of the development's program and water-related facilities.

■ Pier 4 Development

The construction phasing for the Pier 4 Master Plan Initial Proposal presented certain problems, particularly in the first phase of work. Such problems included the lack of a clear functional relationship to the Fan Pier project, and possible disruption to the Pier 4 Restaurant by displacement of parking and accessways. The master plan and phasing proposal for the Lesser-Scale Alternative resolves these problems, and in general, is easier to construct than the Initial

Proposal. Therefore, for the purposes of this construction impact assessment, the phasing plan for the Lesser-Scale Alternative is presented.

Phase I

Construction of the first phase of the Pier 4 Development is expected to commence in fall, 1987, and will last approximately 2 1/2 years, with scheduled completion of Phase I in spring, 1990. This first phase will entail construction of the following elements:

Buildings

- Hotel (250 rooms) and Residential (150 units) building at marina basin
- Office (225,000 s.f.) and Retail (55,000 s.f.) building on Northern Avenue adjacent to the Fan Pier Development
- Underground parking for Phase I uses

Site Amenities and Infrastructure

- Site roadways, curbs, and sidewalks
- All public open space and walkways, Harborpark/Harborwalk facilities
- Cultural facilities depicting the history of Boston Harbor and railroad use of the site and describing the Harborwalk
- Utilities for Phase I, including sewers, storm drainage facilities, water supply, electricity, gas and telecommunications
- Fire protection facilities for Phase I structures

Water-Related Facilities

- Eastern breakwater at entry to marina
- A portion of the marina (approx. 100 slips)
- Repair of failing seawall on west side of Pier 4
- Dredging of the marina for improved marine access
- Docking area for coastal cruise ships
- Docking facilities for an on-demand water-taxi service for Boston Harbor and a special restaurant excursion boat
- Docking facilities for possible use by a cultural water bus (if feasible) and airport water shuttles

Subsequent Phases of Construction

At present, plans for the construction of the Pier 4 Development do not define the timing or extent of construction after Phase I. This work is expected to be completed by 1995, and would include the remainder of the development program, site infrastructure and amenities, and water-related facilities.

■ Construction Activities and Techniques

After determining the nature and extent of existing site conditions, the proponents and their marine contractor are considering the use of several innovative construction techniques to shorten the building period, reduce construction related traffic, and lessen the impacts on water quality and nearby areas. Brief descriptions of these techniques follow:

Slurry Wall Foundation Construction. Slurry walls are rigid, impermeable reinforced concrete foundation walls, which provide the lateral support during excavation and later become the permanent foundation walls. Using this system minimizes water seepage into the foundation excavation, eliminates risk of settlement of adjacent structures (e.g. seawalls and utility lines), and reduces truck deliveries of building materials.

Preassembled Elements. The use of preassembled elements (such as structural steel framing and prestressed, precast concrete elements) where appropriate reduces the quantity of labor and bulk materials that must be delivered to the site and decreases the on-site duration of critical construction activities.

Re-Use of Existing On-Site Materials. The large granite blocks that line what was once a slip between Pier 1 and Pier 2 on the Fan Pier site can be used for the new Fan Pier Development. Re-use of such materials will reduce the quantity of bulk materials that must be delivered to the site, and decrease the quantity of excavated materials to be transported by truck for off-site disposal.

On-Site Disposal of Dredged Material. Disposal of sand, silt and clay from shallower areas of the marina basin in the basin's deeper areas appears to be feasible. This results in a shorter period for dredging and reduces the need for ocean dumping of dredged material. To minimize water quality impacts to Boston Harbor, the entire marina can be "closed off" by silt curtains and floating booms during dredging and other phases of in-the-water construction.

Construction of the Fan Pier Canal in the Dry. In order to minimize water quality effects of the canal's emplacement and reduce the quantity of excavated material to be disposed of off-site, the new Fan Pier canal will be constructed in the dry rather than dredged. Construction of the canal in the dry also will reduce the number of truck trips to the site.

Other innovative construction techniques will be considered once the design of the two projects has advanced beyond the master planning stage.

PROBABLE PROJECT IMPACTS AND MITIGATION MEASURES

The construction activities with the greatest potential of generating on-site and off-site impacts are: excavation and foundation construction; repair of seawalls and construction of the marina; and erection of the superstructure and exterior cladding. Potential short-term impacts due to construction, as well as possible mitigation measures, are addressed as appropriate in the traffic, air quality, noise, water quality, and water-related activities sections of this Chapter, and in Chapters IV and V. Following is a summary of the probable effects to environmental assessment categories, and suggested mitigation measures.

■ Traffic and Parking

Northern Avenue and other roadways leading to the site will be affected by truck trips for waste removal and building material deliveries during various periods of the construction of the two projects. Chapter IV.1, Traffic and Parking, estimates construction worker and truck trips to the sites. Truck trip impacts will be small since only 15 to 20 trucks per hour are expected in connection with peak excavation activities at the sites. Once excavation work is completed, truck trips will decrease. To help reduce the number of truck trips to the site, construction materials and equipment will be stored on-site. The developers and their contractors will also investigate the feasibility of transporting construction materials to and from the sites by barge in order to reduce truck trips to the sites. The maximum number of construction workers on site during the most active construction period is estimated to be approximately 650. However, vehicle trips will be fewer due to ridesharing and transit use. Impacts will be further reduced since many worker-related vehicle trips will be made during off-peak hours. Any impacts from truck and construction worker trips will be offset in part by the discontinuation of commuter parking at Fan Pier.

Some disruption of traffic may occur on Northern Avenue during the construction of buildings at the southern edge of each project, and during the reconstruction of utilities by the various utility providers. The proponents will develop traffic control plans that maintain sufficient vehicular and pedestrian capacities throughout the construction period for the portion of Northern Avenue adjacent to the sites. These traffic control plans will also address the routing and timing of construction related trips to avoid impacts on residential areas and congested city streets. These plans will be prepared and reviewed in conjuction with the City of Boston Traffic and Parking Department the Massachusetts Port Authority, and the Massachusetts Department of Public Works.

■ Air Quality

Short-term, temporary air quality impacts from fugitive dust and truck exhaust emissions will occur during construction, as described in Chapter IV.2, Air Quality. Maximum 24-hour TSP impacts at sensitive receptors located off the development site are predicted to range between 3 and 14 ug/m3, or 2 to 9 percent of the National Ambient Air Quality Standard of 150 ug/m^3. Any adverse effects will be further minimized due to the distance of the site from residential areas and heavily-used pedestrian walkways. Measures will be taken to prevent excessive emissions of particulate matter during construction, complying with Massachusetts Air Pollution Control Regulation 7.09. Exposed soil and on-site construction roads will be watered down on a daily basis during dry periods. Seeding, covering, or paving of exposed surfaces will be accomplished as soon as possible in the construction process. Placement of temporary retaining walls around construction areas will also reduce fugitive dust.

Prior to construction, some demolition work will need to be done on sites. Site inspections will be conducted to determine if asbestos is present in any structures slated for demolition. If abestos is found, the Massachusetts Department of Environmental Quality Engineering (DEQE) will be notified and a removal plan will be formulated that complies with Massachusetts Air Pollution Control Regulation 7.15. DEQE will be notified of the demolition plans in writing 20 days prior to any action.

■ Noise

Sources of construction related noise will include pile driving and heavy equipment operations on-site, and truck trips to the sites, as described in Chapter IV.3, Noise. Incremental noise impacts should be minimal given the distance of the projects from residential neighborhoods, heavily used pedestrian areas, and other sensitive receptors, and given the background noise from urban and aircraft sources. Nonetheless, the proponents will consult with DEQE concerning noise mitigation. As noted above, the traffic control plan to be developed in consultation with the Boston Traffic and Parking Department will also help to minimize adverse effects of off-site noise emissions due to construction truck trips.

■ Water Quality

Possible effects on water quality from reconstruction of seawalls, dredging, pile driving, and dewatering activities have been thoroughly examined in Chapter VI.1, Water Quality. The slurry wall construction technique will help mitigate the impacts on water quality by minimizing lateral ground water seepage in the excavated area, reducing the need for site de-watering. Additional mitigation measures have already been specified as part of these procedures, including:

use of floating booms to retain debris; complete removal of existing timber piles; use of a clamshell dredge; dredging and dewatering behind silt curtains; continual monitoring of water quality during dredging; and use of driven rather than jetted piles to lessen turbidity. Retention of existing seawalls and the use of clean, coarse temporary fill where seawall stabilization is needed will minimize erosion along the waterfront perimeter, serving to minimize adverse water quality effects. To further minimize turbidity impacts, precipitation and groundwater seepage will collect in, or be pumped to, settling areas before discharge to the area enclosed by silt curtains. As noted previously, the Fan Pier Canal will be constructed in the dry to avoid water quality impacts.

As part of the effort to minimize water quality impacts, the proponents of the two projects will consult with the Boston Conservation Commission, the Massachusetts Division of Water Pollution Control (DEQE), and the U.S. Corps of Engineers as construction plans are prepared.

■ Water-Related Activities

A construction plan that allows maintenance of present excursion boat activities from locations on the Fan Pier site through the construction period is currently being evaluated, and will be presented, if available, in the Final EIR. This plan will be prepared in consultation with the excursion boat operator.

COORDINATION WITH NEARBY CONSTRUCTION PROJECTS

As described in Chapters I, II and III of this Draft EIR, the Fan Pier and Pier 4 Developments are completely separate projects, proposed by separate developers, and designed by separate architects. In order to create compatible developments and satisfy the MEPA request for a jointly filed EIR, extensive coordination and cooperation between the two projects has occurred during the course of the master planning of the two developments. Although future environmental documentation and permit applications will probably be filed separately for each of the two projects, coordination between the developers will continue to occur to the extent feasible. This coordination will be of particular significance during construction of the two projects to avoid conflicts and to provide consistent impact mitigation procedures.

■ Other Developments

During the construction periods for the Fan Pier and Pier 4 projects, other development projects may occur in nearby areas of South Boston (see Chapter II). Although the status of several of these projects remains unclear, the proponents of Fan Pier and Pier 4 have initiated discussions with various developers and agencies (including Massport and EDIC) to avoid project conflicts during construction. It is too early in the master planning process to determine if any of the most intensive construction periods--such as excavation, foundation construction, and erection of superstructure and exterior cladding--will occur contemporaneously. The Fan Pier and Pier 4 Developers will continue to coordinate with the Massachusetts DPW and the City of Boston concerning reconstruction of the Northern Avenue Bridge.

The potential areas of environmental impact of these activities include traffic and parking, air quality, noise, and the impact on local businesses. Based upon an initial review of these issues, it would appear that air quality and noise impacts are all site specific. Such short-term impacts would not create conflicts between the projects, and should be properly addressed independently by each area developer within the confines of each project site and operation.

With regard to traffic and parking impacts, the truck traffic required for these projects may use many of the same roadways as the Fan Pier and Pier 4 projects. Each developer in the area will need to prepare a traffic control plan and review it for consistency and conflicts with the Boston Traffic and Parking Department.

With regard to impact on area businesses, the only potential impact might be an increase in food service demand from on-site construction workers. This may encourage the development or expansion of existing coffee shops and food service establishments in the area.

The proponents will make arrangements to hold preconstruction meetings in Summer or Fall, 1986, with any selected contractors for other area projects to review coordination plans.

■ Northern Avenue Bridge

The success of the Fan Pier and Pier 4 Developments and other proposed developments in this area of South Boston depend upon timely completion of the new Northern Avenue bridge and roadway. The proponents are coordinating their efforts with those of the Massachusetts Department of Public Works, the Boston Traffic and Parking Department, and the Boston Redevelopment Authority to facilitate the bridge/roadway project.

■ Utilities and Infrastructure

As noted in the Chapter VI section on Infrastructure, the proponents have initiated discussions with the following service providers to coordinate installation of support infrastructure and utilities along Northern Avenue to the project sites:

- Boston Water and Sewer Commission
- Boston Edison
- Boston Gas
- New England Telephone
- Boston Fire Alarm
- Boston Cablevision

The objectives of this coordination effort are: to inform the service providers about current plans, to assure the availability of utilities and infrastructure on a timely basis, and to minimize construction period impacts.

VII

Measures to Mitigate Adverse Affects

INTRODUCTION

Provided here is a summary of mitigation measures which are proposed to minimize the potential adverse effects of the Fan Pier Development and Pier 4 Development. A more detailed discussion of these measures is included in each of the environmental impact categories addressed in Chapters IV, V, and VI. For mitigation measures that require actions by public agencies, the proponents are committed to working cooperatively with the appropriate agencies to achieve these objectives. No mitigation measures would be associated with the No-Build Alternatives.

TRAFFIC-RELATED ISSUES

■ Traffic and Parking

- o Encourage planning of the Seaport Access Road/Third Harbor Crossing by the Massachusetts Department of Public Works (MDPW) and the Massachusetts Port Authority (Massport).
- o Encourage the Boston Traffic and Parking Department and the MDPW to increase local roadway capacity by advancing construction of links to the proposed Seaport Access Road.
- o Work cooperatively with the Boston Traffic and Parking Department, and the Metropolitan District Commission in an effort to make traffic operations improvements to intersections, arterials, and the overall traffic system in the South Boston area.
- o Advance planning by the MDPW of the proposed Railroad Cut Bypass Route.

- Encourage the Boston Traffic and Parking Department to conduct a South Boston neighborhood traffic planning study of the type now being undertaken in several other areas of the city.

- Require employers (office and retail tenants) to introduce and maintain programs which encourage ridesharing as well as use of mass transportation.

- Introduce shuttle bus service from the sites and nearby development areas to South Station and other downtown public transportation nodes. The service may be implemented by the Massachusetts Bay Transportation Authority (MBTA), the project proponents, other South Boston developers, or some combination of these parties.

- Work with the MDPW, MBTA, and Executive Office of Transportation and Construction (EOTC) to expand commuter boat service to South Boston.

- If feasible, implement a water shuttle service to improve access between the sites and downtown public transportation nodes.

- Work with the MBTA, BRA, other developers, and Massport to introduce an on-demand water taxi service to connect the South Boston waterfront with other harborside destinations, including North Station, Charlestown, East Boston (Logan Airport), and prominent downtown wharves.

- Cooperate with the MBTA and the BRA to facilitate transfers between major public transportation services, including express buses, at the South Station Transportation Center.

- Encourage the MBTA, Massachusetts Legislature, and MDPW to provide subsidies to all forms of public transportation in an effort to encourage transit ridership in the region.

- Promote policies of the MBTA and BRA which minimize the cost of parking at outlying public transportation feeder facilities.

- Support the efforts of city and state agencies to provide a public information system describing transportation services available to commuters.

- Encourage the MBTA to expand local bus service to commercial and industrial development areas in South Boston.

- Develop a close working relationship between project hotel operators and developers at other South Boston projects, such as the World Trade Center, so that out-of-town employees and visitors stay in the Fan Pier and Pier 4 hotels, and to provide a courtesy shuttle to major South Boston and downtown destinations and Logan Airport.

- Manage the available parking supply at the sites to allocate spaces for non-commuters and to create incentives for employee ridesharing and transit use.
- Encourage the MBTA to continue implementation of improvements to its rail transit system, particularly the Red Line.
- Encourage the Boston Traffic and Parking Department, BRA, and MDPW to maintain pedestrian access across the existing Northern Avenue Bridge.
- Promote the investigation of the reintroduction of rail service to the South Shore by the MBTA, Central Transportation Planning Staff (CTPS), and EOTC.
- Encourage the CTPS, MBTA, and MDPW to expand the availability of satellite parking facilities with related express bus service to downtown locations.

■ Air Quality

- Encourage the adjustment of traffic signal timing at the intersection of Summer Street and Viaduct Street to reduce queuing delays for southbound traffic on Viaduct Street.
- Encourage the conversion of Atlantic Avenue south of Summer Street to one-way operation northbound, and encourage the adjustment of traffic signal timing at the intersection of Atlantic Avenue and Summer Street to reduce the Atlantic Avenue northbound queue length.
- Encourage the addition of a third westbound through lane to New Northern Avenue, and encourage the addition of a fourth southbound lane to the link road to the Seaport Access Road. These actions will increase capacity and reduce queue lengths at the intersection of New Northern Avenue and the southbound link road to the Seaport Access Road.
- Advocate continuation of the State Inspection and Maintenance Program.
- Minimize fugitive dust emissions during construction, by wetting, seeding, covering, and paving.
- Prepare and implement a Massachusetts Department of Environmental Quality Engineering (DEQE) approved asbestos removal plan if inspection indicates the presence of asbestos in any structures to be demolished.

■ Noise	o Coordinate with governmental agencies in the implementation of appropriate traffic-related mitigation measures, which will also aid in reducing noise levels.
	o Support full compliance with federal noise emission standards for commercial aircraft.
	o Design and construct project buildings to attenuate noise to appropriate indoor levels.
	o Utilize measures to control construction-related noise impacts, such as proper construction scheduling, the use of mufflers on appropriate equipment, and the placement of temporary barriers to shield any nearby receptors.

URBAN DESIGN ISSUES

■ Visual Quality	o Continue intensive project-review process with the BRA, the Fan Pier and Pier 4 Civic Advisory Committee, and the Harborpark Advisory Committee.
■ Shadow	o No adverse impacts are anticipated based on a computer analysis.
■ Wind	o Conduct detailed quantitative wind tunnel analyses, including the evaluation of possible mitigation measures, when the projects advance beyond the master plan stage into schematic design.
■ Tidelands and Public Purpose	o Comply with the objectives of proposed draft regulations for Chapter 91 of the Massachusetts General Laws.
■ Public Access	o Continue review of public access plans with the BRA, the Fan Pier and Pier 4 Civic Advisory Committee, the Harborpark Advisory Committee, the State Interagency Coordinating Committee for the Fan Pier and Pier 4 Developments, and other groups who have expressed an interest in expanding public access along the waterfront.
■ Water-Related Activities	o Continue to work with the State Interagency Coordinating Committee for the Fan Pier and Pier 4 Developments, the Water Transportation Task Force, boat operators, harbor advocates, and other interested groups to provide appropriate water-related uses as an integral part of the proposed mixed-use developments.

CONSTRUCTION AND OPERATIONS ISSUES

■ Water Quality

- Perform dredging with a clamshell dredge behind silt curtains, and closely monitor water quality during dredge operations.
- Drive timber piles and steel pipe piles with percussion methods within silt curtains.
- Place permanent structural stabilizing fill (rip-rap) along failing seawalls with buckets, rather than dumping fill in the water, and confine the fill sites within silt curtains.
- Reduce the amount of construction dewatering through the use of slurry cut-off walls and concrete wall construction techniques that will effectively eliminate lateral water seepage into the excavation areas.
- Conduct any dewatering discharge behind silt curtains to allow suspended material to settle before being transported any significant distance from the discharge point.
- Coordinate with DEQE concerning the disposal of excavated materials.
- Remove the hull of the Peter Stuyvesant inside silt curtains using appropriate oil spill control techniques.

■ Infrastructure

- Continue to coordinate infrastructure plans with the Boston Water and Sewer Commission (BWSC) and the utility companies.
- Provide and maintain grease traps which meet Title V Sanitary Code requirements in all restaurant kitchen facilities.
- In accordance with the State Building Code, use water conservation devices, such as low-flow toilets and flow-restricting faucets and shower heads, to reduce water and energy use and wastewater flows from the developments.
- Construct gas and oil separators with proper venting in storm drains to minimize discharge of these materials to the harbor.
- Mitigate adverse impacts due to the provision of the electric, gas, and telephone systems to service the development sites by: coordinating facilities planning with providers of utilities; installing utilities underground to improve visual quality; incorporating energy conservation into project design

and operation; reducing fugitive dust emissions through good construction practices; and scheduling construction activities to minimize traffic disruptions and interruption of utility service.

■ Construction

- o Reduce the number of truck trips to the site by storing construction materials and equipment as appropriate on-site.
- o Investigate the feasibility of transporting construction materials to and from the site by barge.
- o Prepare traffic control plans that maintain access along the portion of Northern Avenue adjacent to the sites and address the routing and timing of construction-related trips to avoid impacts on residential areas and congested city streets.
- o Review traffic control plans with the Boston Traffic and Parking Department, Massport, and the MDPW.
- o Take measures to minimize emissions of fugitive dust during construction, in compliance with Massachusetts Air Pollution Control Regulations. The measures include: watering down exposed soil and on-site construction roads during dry periods; seeding, covering, or paving exposed surfaces as soon as possible in the construction process; and placing temporary retaining walls around construction areas.
- o Notify DEQE if asbestos is found in any structures slated for demolition, and formulate a removal plan that complies with Massachusetts Air Pollution Control Regulations.
- o Coordinate the construction of the Fan Pier and Pier 4 projects to provide consistent impact mitigation procedures.
- o Coordinate with the MDPW, the city, and with other area developers and their contractors concerning construction scheduling and procedures.
- o Coordinate with BWSC and other utility providers concerning the installation of support infrastructure and utilities along Northern Avenue to serve the project sites.

VIII

Reviewers

INTRODUCTION	This Draft EIR will be distributed to the city, state and federal agencies, and interested parties listed below. This list includes those entities that MEPA regulations require as part of the legal review of this document; representatives of the governmental agencies that have participated in the ongoing interagency public review process established for these projects; the Fan Pier and Pier 4 Civic Advisory Committee, and the Harborpark Advisory Committee (both appointed by the Boston Redevelopment Authority); public interest groups with a special interest in the waterfront and/or South Boston; and individuals who have commented on the projects since the filing of the Environmental Notification Forms. Copies of this Draft EIR are available from Cheryl Quick, Skidmore, Owings & Merrill, 334 Boylston Street, Boston, MA 02116 (617-247-1070).

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Appendix

Environmental Notification Forms

Following are the Environmental Notification Forms (ENFs) filed for each project with the Massachusetts Executive Office of Environmental Affairs. The Fan Pier ENF (referred to at the time of submission as Piers 1, 2, 3) was noticed in the Environmental Monitor on May 21, 1982, while the Pier 4 ENF was noticed on December 22, 1982. The comments on the ENFs are presented in Volume 2 of the Technical Appendices.

APPENDIX A
COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

ENVIRONMENTAL NOTIFICATION FORM

I. SUMMARY

A. Project Identification

1. Project Name Piers 1, 2, 3

2. Project Proponent HBC Associates

Address c/o Carpenter & Company, Inc.
175 Federal Street, Boston, MA 02110

B. Project Description: (City/Town(s) Piers 1, 2, 3

1. Location within city/town or street address South Boston
Boston, MA

2. Est. Commencement Date: 1984 **Est. Completion Date:** 1987 (Phase 1) Later Phases Indefinite

Approx. Cost $ 350,000,000 to 450,000,000 **Current Status of Project Design:** 5 **% Complete**

C. Narrative Summary of Project

Describe project and give a description of the general project boundaries and the present use of the project area. (If necessary, use back of this page to complete summary).

The Piers 1, 2, 3 development is proposed to be a major mixed-use project on 18.5± acres along the waterfront in Boston, Massachusetts. The site lies at the mouth of Fort Point Channel and is bounded by Northern Avenue to the south and by Pier 4 to the east. The site was originally tidal flats and has been filled progressively since the turn of the century with the most recent filling between Piers 1 and 2 in October of 1969. The site is currently used for warehousing and at-grade parking. Two warehouse structures currently exist on the site; both will be demolished if the project goes forward.

Anticipated new uses for the site include luxury hotel space, convention/exhibition space, retail space, residential units, parking and marina. Included in the retail space will be specialty shops, boating supplies, restaurants, etc. The residential units will be designed in a variety of building types, including townhouse, mid-rise, and high-rise. Structured parking will be located within or adjacent to all major facilities and private parking spaces will be available to residents. Approximately fifty slips will be provided in the marina.

The total built area of the project will not exceed 4.5 F.A.R. Listed below is a conceptual schedule of uses that may be included in the project. These areas are listed here for purposes of environmental analysis only and will be revised as the project proceeds. This conceptual schedule will permit the establishment in the Environmental Impact Report of an upper limit to impacts on traffic, sewage, water, solid waste, building height, and other relevant categories regardless of the project's specific programmatic composition.

Copies of this may be obtained from:

Name: Martha Lampkin **Firm/Agency:** Skidmore, Owings & Merrill

Address: 334 Boylston Street, Boston, MA 02116 **Phone No.** (617) 247-1070

979 **THIS IS AN IMPORTANT NOTICE. COMMENT PERIOD IS LIMITED.**
For Information call (617) 727-5830

ENF FOR PIERS 1,2,3
(now referred to as Fan Pier Dev.

Use This Page to Complete Narrative, if necessary.

Use	Approximate Area
Hotel	850,000 s.f.
Office	850,000 s.f.
Retail	100,000 s.f.
Residential	1,000,000 s.f.
Parking	825,000 s.f.

Important features of this development include substantial maritime use of the property, public access to the waterfront, maximization of views, orientation of buildings for solar energy use, protection of outdoor uses from wind exposure, and improved vehicular access.

This project is one which is categorically included and therefore automatically requires preparation of an Environmental Impact Report: YES X NO ____

D. Scoping (Complete Sections II and III first, before completing this section.)

1. Check those areas which would be important to examine in the event that an EIR is required for this project. This information is important so that significant areas of concern can be identified as early as possible, in order to expedite analysis and review.

	Construction Impacts	Long Term Impacts
Open Space & Recreation		X
Historical		
Archaeological		
Fisheries & Wildlife	X	
Vegetation, Trees		
Other Biological Systems		
Inland Wetlands		
Coastal Wetlands or Beaches	X	X
Flood Hazard Areas	X	X
Chemicals, Hazardous Substances, High Risk Operations	X	
Geologically Unstable Areas		
Agricultural Land		

	Construction Impacts	Long Term Impacts
Mineral Resources		
Energy Use		
Water Supply & Use		
Water Pollution	X	
Air Pollution	X	X
Noise	X	X
Traffic	X	X
Solid Waste		
Aesthetics		X
Wind and Shadow		
Growth Impacts		X
Community/Housing and the Built Environment		X
Other (Specify)		

2. List the alternatives which you would consider to be feasible in the event an EIR is required.

The alternatives to this proposal include:

1) continued use of the site for parking and warehouses
2) variations of this project based on different comparative intensities of use within the same total intensity of development
3) Other uses or combinations not presently proposed by any proponent

E. Has this project been filed with EOEA before? Yes ____ No X
If Yes, EOEA No. ____ EOEA Action? ____

F. Does this project fall under the jurisdiction of NEPA? Yes X No ____
If Yes, which Federal Agency? ACOE NEPA Status? Under review

G. List the State or Federal agencies from which permits will be sought:

Agency Name	Type of Permit
See Attachment 1.	

H. Will an Order of Conditions be required under the provisions of the Wetlands Protection Act (Chap. 131, Section 40)?
Yes X No ____
DEQE File No., if applicable: ____

I. List the agencies from which the proponent will seek financial assistance for this project:

Agency Name	Funding Amount
None	

II. PROJECT DESCRIPTION

A. Include an original 8½ x 11 inch or larger section of the most recent U.S.G.S. 1:24,000 scale topographic map with the project area location and boundaries clearly shown. Include multiple maps if necessary for large projects. Include other maps, diagrams or aerial photos if the project cannot be clearly shown at U.S.G.S. scale. If available, attach a plan sketch of the proposed project. See Attachments 2 and 3.

B. State total area of project: 18.5± acres
Estimate the number of acres (to the nearest 1/10 acre) directly affected that are currently:

1. Developed .... ____ acres
2. Open Space/Woodlands/Recreation 18.5± acres
3. Wetlands .... ____ acres
4. Floodplain ....
5. Coastal Area .... } 2.0± acres *
6. Productive Resources
   - Agriculture .... ____ acres
   - Forestry .... ____ acres
   - Mineral Products .... ____ acres

*consists of open water

C. Provide the following dimensions, if applicable:
Length in miles ____ Number of Housing Units 1,000 Number of Stories 2 to 38

	Existing	Immediate Increase Due to Project
Number of Parking Spaces	1000±	2000±
Vehicle Trips to Project Site (average daily traffic)	2000±	16,.000± Two Way
Estimated Vehicle Trips past project site. (Northern. Ave.)	20,560±	14,000±

D. If the proposed project will require any permit for access to local or state highways, please attach a sketch showing the location of the proposed driveway(s) in relation to the highway and to the general development plan; identifying all local and state highways abutting the development site; and indicating the number of lanes, pavement width, median strips and adjacent driveways on each abutting highway; and indicating the distance to the nearest intersection.

III. ASSESSMENT OF POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS

Instructions: Consider direct and indirect adverse impacts, including those arising from general construction and operations. For every answer explain why significant adverse impact is considered likely or unlikely to result.

Also, state the *source* of information or other basis for the answers supplied. If the source of the information, in part or in full, is not listed in the ENF, the preparing officer will be assumed to be the source of the information. Such environmental information should be acquired at least in part by field inspection.

A. Open Space and Recreation

1. Might the project affect the condition, use or access to any open space and/or recreation area?
Yes ___X___ No ______

Explanation and Source:

The site is currently used as parking space and for warehousing. No recreation or open space area presently exists on the site. The development, howevery, will provide new recreation space and will allow for public access.

B. Historic Resources

1. Might any site or structure of historic significance be affected by the project? Yes ______ No ___X___

Explanation and Source:

The existing buildings on this site have no historic significance.

2. Might any archaeological site be affected by the project? Yes ______ No ___X___

Explanation and Source:

No archaeological sites are known to exist within the proposed project boundaries.

C. Ecological Effects

1. Might the project significantly affect fisheries or wildlife, especially any rare or endangered species?
Yes ______ No ___X___

Explanation and Source:

The project will have no impact on any known rare or endangered species. A limited amount of dredging will be required to connect the proposed marina to Boston Inner Harbor. This will cause a loss of marine flora and fauna in the immediate area, including infauna and relatively immobile crustaceans and shellfish.

2. Might the project significantly affect vegetation, especially any rare or endangered species of plant?
Yes ______ No __X__
(Estimate approximate number of mature trees to be removed: __None__)

Explanation and Source:

See Attachment 1.

3. Might the project alter or affect flood hazard areas, inland or coastal wetlands (e.g., estuaries, marshes, sand dunes and beaches, ponds, streams, rivers, fish runs, or shellfish beds)? Yes ______ No __X__

Explanation and Source:

See Attachment 1.

4. Might the project affect shoreline erosion or accretion at the project site, downstream or in nearby coastal areas? Yes ______ No __X__

Explanation and Source:

The adjacent shorelines along the Fort Point Channel and the southern side of the Boston Inner Harbor, as well as the shoreline fronting the project site, are protected by form-fitted granite block seawalls and wooden bulkheads which extend below the mean low water line.

5. Might the project involve other geologically unstable areas? Yes __X__ No ______

Explanation and Source:

The shoreline of the proposed marina will require protective measures to prevent slumping of the boundary sediments. In addition, the fill and underlying marine sediments of the site will not support standard foundations. Most new structures will therefore require pile or caisson footings. Samples of the fill and underlying sediments are to be analyzed for their physical characteristics before final design.

D. Hazardous Substances

1. Might the project involve the use, transportation, storage, release, or disposal of potentially hazardous substances?
Yes __X__ No ______

Explanation and Source:

See Attachment 1.

E. Resource Conservation and Use

1. **Might the project affect or eliminate land suitable for agricultural or forestry production?**
Yes ______ No __X__
(Describe any present agricultural land use and farm units affected.)

Explanation and Source:

The site is not suitable for agricultural use.

2. **Might the project directly affect the potential use or extraction of mineral or energy resources (e.g., oil, coal, sand & gravel, ores)?** Yes ______ No __X__

Explanation and Source:

No mineral or energy resources are known to exist on the site.

3. **Might the operation of the project result in any increased consumption of energy?** Yes __X__ No ______

Explanation and Source:
(If applicable, describe plans for conserving energy resources.)

Utility demands generated by this project will fall well within local supply capacity. Building design standards for insulation, solar orientation, and other energy related features will ensure efficient energy use. Construction will meet all applicable codes including the Massachusetts Energy Code requirements.

F. Water Quality and Quantity

1. **Might the project result in significant changes in drainage patterns?** Yes ______ No __X__

Explanation and Source:

No significant changes in drainage patterns will result from the proposed development. Relocation of local storm drains may be necessary, and the addition of storm drains for paved vehicle accessways and walkways will be required to prevent localized ponding of storm water.

2. **Might the project result in the introduction of pollutants into any of the following:**

(a) Marine Waters .... Yes __X__ No ______
(b) Surface Fresh Water Body .... Yes ______ No __X__
(c) Ground Water .... Yes ______ No __X__

Explain types and quantities of pollutants.

During construction, there will be a potential for the introduction of turbidity and suspended solids into the Harbor via site stormwater runoff. Standard construction mitigation measures will be implemented to prevent such occurrences. Turbidity and suspended solids will also be introduced to the Harbor when the marina area is excavated. The method of disposal of any excess excavated fill, if any, has not yet been determined.

3. Will the project generate sanitary sewage? Yes X No ____

If Yes, Quantity: 425,000± gallons per day *

Disposal by: (a) Onsite septic systems .... Yes ____ No X

(b) Public sewerage systems .... Yes X No ____

(c) Other means (describe) ____

*Based on standards listed in DEQE Title 5 - Sanitary Sewage, as applied to the conceptual schedule outlined in Section I.C.

4. Might the project result in an increase in paved or impervious surface over an aquifer recognized as an important present or future source of water supply? Yes ____ No X

Explanation and Source:

See Attachment 1.

5. Is the project in the watershed of any surface water body used as a drinking water supply?

Yes ____ No X

Are there any public or private drinking water wells within a 1/2-mile radius of the proposed project?

Yes ____ No X

Explanation and Source:

There are no known water supplies as described above. Drinking water is supplied via the Boston water distribution system, which is served by the Metropolitan District Commission.

6. Might the operation of the project result in any increased consumption of water? Yes X No ____

Approximate consumption 490,000 gallons per day. Likely water source(s) Boston Water & Sewer Commissi

Explanation and Source:

Based on standards listed in DEQE Title 5 - Sanitary Sewage plus 15%.

7. Does the project involve any dredging? Yes X No ____

If Yes, indicate:

Quantity of material to be dredged To be determined

Quality of material to be dredged To be determined

Proposed method of dredging To be determined

Proposed disposal sites To be determined

Proposed season of year for dredging To be determined

Explanation and Source:

See Attachment 1.

G. Air Quality

1. Might the project affect the air quality in the project area or the immediately adjacent area?
Yes _X_ No _____

Describe type and source of any pollution emission from the project site. Construction dust
Indirect mobile source

Construction activity will result in short-term air quality effects. During project operations, the primary source of air pollutants will be from increased vehicular activity at the site.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any pollution emissions caused by the project, including construction dust? Yes _X_ No _____

Explanation and Source:

Dockside Place Condominiums - Sleeper Street
Our Lady of Good Voyage Church - Northern Avenue
Children's Museum - Sleeper Street at Congress Street

3. Will access to the project area be primarily by automobile? Yes _X_ No _____
Describe any special provisions now planned for pedestrian access, carpooling, buses and other mass transit.

H. Noise

1. Might the project result in the generation of noise? Yes _X_ No _____

Explanation and Source:
(Include any source of noise during construction or operation, e.g., engine exhaust, pile driving, traffic.)

Noise will be generated during the construction phase, primarily by earth moving equipment, demolition, dredging and pile emplacement activities. Long-term noise effects will result from increased levels of vehicular activity at the site.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any noise caused by the project? Yes _X_ No _____

Explanation and Source:

See G.2.

I. Solid Waste

1. Might the project generate solid waste? Yes ___X___ No ______

Explanation and Source:
(Estimate types and approximate amounts of waste materials generated, e.g., industrial, domestic, hospital, sewage sludge, construction debris from demolished structures.)

See Attachment 1.

J. Aesthetics

1. Might the project cause a change in the visual character of the project area or its environs?
Yes ___X___ No ______

Explanation and Source:

The project will dramatically improve the visual character of the site, providing a combination of low- and high-rise structures with a new marina, dock and outdoor recreation space. Currently, the site is used predominantly for at-grade parking.

2. Are there any proposed structures which might be considered incompatible with existing adjacent structures in the vicinity in terms of size, physical proportion and scale, or significant differences in land use?
Yes ______ No ___X___

Explanation and Source:

As one of the leading projects in the redevelopment of this section of the waterfront, this project incorporates structures and land uses that differ from current patterns in the area. However, the project is well in keeping with proposals for neighboring sites and with recent development in downtown Boston.

3. Might the project impair visual access to waterfront or other scenic areas? Yes ___X___ No ______

Explanation and Source:

Because of the location of the site, the only views of the waterfront that will be impaired are from the warehouse and industrial buildings south of the site. On the whole, visual access is improved with this project since in gaining access to the site, the general public is offered new views of the harbor, the skyline, and the airport.

K. Wind and Shadow

1. Might the project cause wind and shadow impacts on adjacent properties? Yes ______ No ___X___

Explanation and Source:

The site is bounded to the north, east, and west by water. Shadows created by new structures on the site will fall primarily onto the water. The few instances of shadows falling on neighboring properties include: the early morning (6:00 am) sun at the summer solstice (June 21) when some shadows are likely to fall on Northern Avenue, and the evening sun (6:00 pm) in all seasons when shadows will fall on Pier 4. (This information is based on detailed shadow studies of the preliminary mater plan for this project area.) No adverse wind impacts on adjacent properties are anticipated.

IV. CONSISTENCY WITH PRESENT PLANNING

A. Describe any known conflicts or inconsistencies with current federal, state and local land use, transportation, open space, recreation and environmental plans and policies. Consult with local or regional planning authorities where appropriate.

No known conflicts with current governmental plans and policies exist. The project provides a new amenity to the public through aesthetic improvement and access to the waterfront, and increases the tax base of the city.

V. FINDINGS AND CERTIFICATION

A. The notice of intent to file this form has been/will be published in the following newspaper(s) :

(Name)	(Date)
Boston Globe	May 21, 1982
South Boston Tribune	May 21, 1982
Boston Herald American	May 21, 1982

B. This form has been circulated to all agencies and persons as required by Appendix B. HBC Associates, by Carpenter Properties, Inc., a partner

May 14, 1982
Date

by: Richard L. Friedman, President

Richard Friedman, HBC Associates
Name (print or type)

Address c/o Carpenter & Co. Inc.
175 Federal Street,
Boston, MA 02110

Telephone Number (617) 542-7500

May 14, 1982
Date

Signature of person preparing ENF
(if different from above)

David B. Smith
Skidmore, Owings & Merrill
Name (print or type)

Address 334 Boylston Street
Boston, MA 02116

Telephone Number (617) 247-1070

ATTACHMENT 1

I.G.

Agency Name	Type of Permit
DEQE (Waterways)	Dredging and Disposal of Dredged Material Permit
DEQE (Waterways)	Chapter 91 - Waterways License
DEQE (Waterways)	Chapter 91 - Section 10A Approval of Floats and Rafts
DEQE (Air Quality Control)	New Sources of Air Contaminants Review
DEQE (Water Pollution Control)	Water Quality Certification
DEQE (Water Pollution Control) and MDC	Sewer Extension Permit
Mass. DPW	Traffic Control Signal Permit
ACOE	Section 404 Dredge and Fill Permit Within Navigable Waters
FAA	Section 77 Federal Aviation Regulations Review
CZM	Consistency Review

III.C.2.

The project site consists primarily of paved land and rubble. Vegetation within the site boundaries is limited to herbaceous plant species, such as vetch (*Vicia angustifolia L.*), crabgrass (*Digitaria ischaemum*), and dandelion (*Taraxacum officinale*), growing in isolated areas of exposed soils. No State or Federally listed or proposed rare or endangered species are known in the project area and none were observed during site inspection.

III.C.3.

No salt marshes or other areas of environmental significance such as dunes and beaches, ponds, streams, or rivers will be affected by the proposed development. In addition, the project area is outside the limits of the 100 uear flood, as mapped by FEMA (April 1, 1982). Should fill be required in portions of the area between Piers 3 and 4, surface elevations will be established above 100 year flood levels. Shellfish in the small area at the mouth of the marina will be impacted during the connection of the marina to the harbor, as will those in any fill areas. However, they are of no present commercial significance.

III.D.1.

The construction of the project (but not its subsequent operation) will require the use of potentially hazardous materials during construction, including oil-based materials for equipment maintenance and roadway paving, and entrainment fluids for use in concrete mixing, as per typical construction practices.

The nature of the existing fill material is not known. Prior to construction, bulk elutriate analyses of samples of the fill material from within the site boundaries will be conducted.

III.F.4.

The aquifer underlying Boston, including the Harbor, is not recognized as an important present or future source of water supply. The Gillette Company utilizes the Fort Point Channel for process water, but not for potable water supply. The Fish Pier and the Neptune and Hook Lobster Companies also utilize harbor water to supply their holding tanks. The proposed project will not affect any such water use in the Fort Point Channel or Boston Inner Harbor.

III.F.7.

The proposed development will consist of a combination of residential and hotel units, and commercial, office, and retail space encircling a cove/marina in the center of the site. The project site consists of fill material deposited over marine sediments. Consequently, construction excavations for these facilities will be limited primarily to fill materials. To connect the marina to the Boston Inner Harbor will require breaching of the stone seawall which borders the site, and dredging a channel to the Harbor. The amount of dredge material will depend on final construction plans, including the width of the marina entrance, and the water depths immediately offshore of the site. Water depths within Boston Inner Harbor are sufficient for the small pleasure craft which will be utilizing the marina. Accordingly, dredging should be limited to the immediate nearshore region of the marina inlet. Sediment samples offshore of the marina will be collected and will undergo complete bulk and elutriate analyses to determine the most appropriate methods for dredging and disposing of these materials.

III.I.1.

Total	Up to 4,000 tons/year*

*Based on standards given in *A Primer on Industrial Environmental Impact*. Michael R. Greenburg *et al*. Rutgers Center for Urban Policy Research, 1979, as applied to the conceptual schedule outlined in Section I.C.

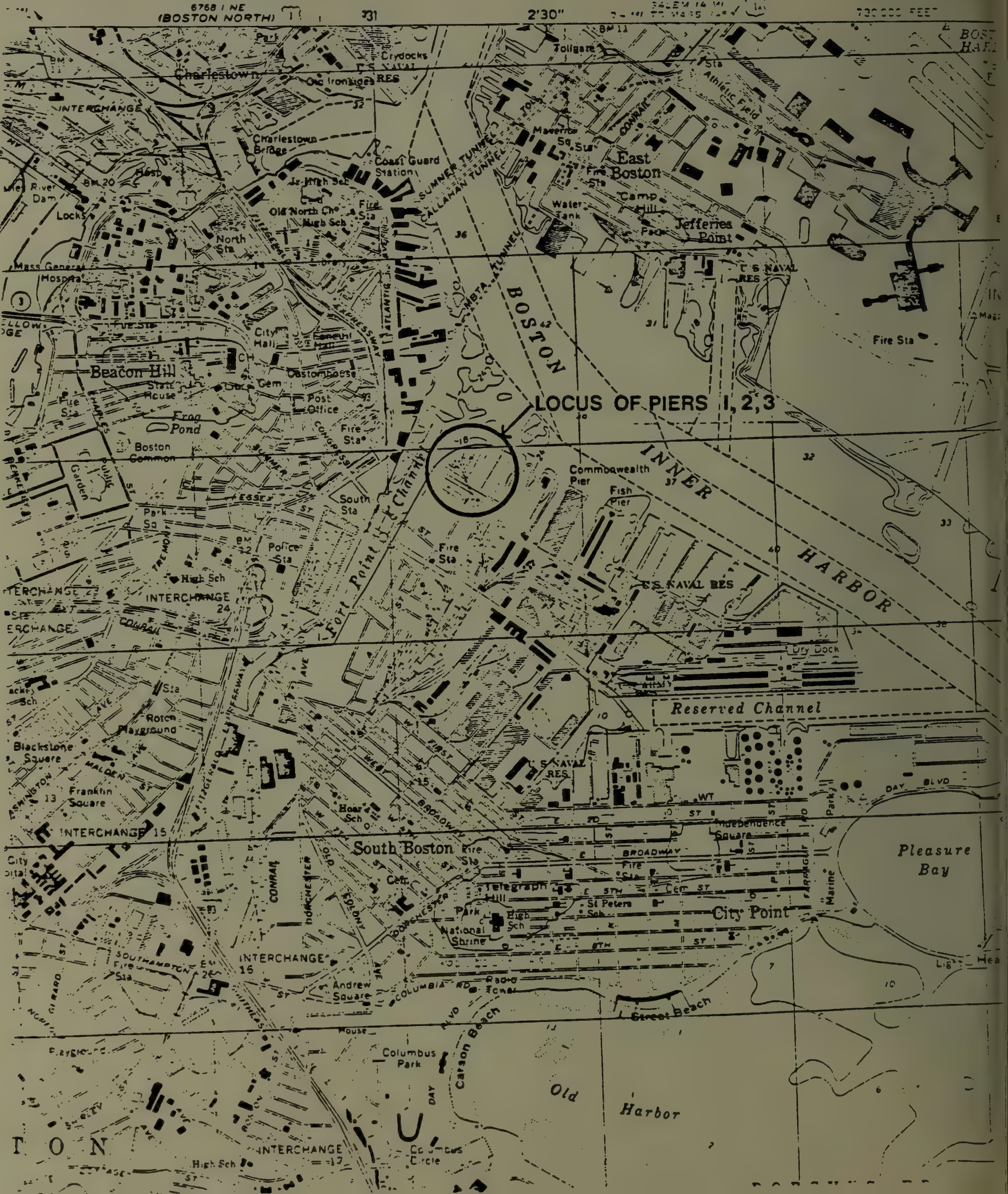
Solid waste generated by potential office, hotel, exhibition and restaurant users will be handled through a contract disposal service. Disposal of construction debris will be the responsibility of the developer and contractors.

ATTACHMENT 2

U.S.G.S. LOCATION MAP

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

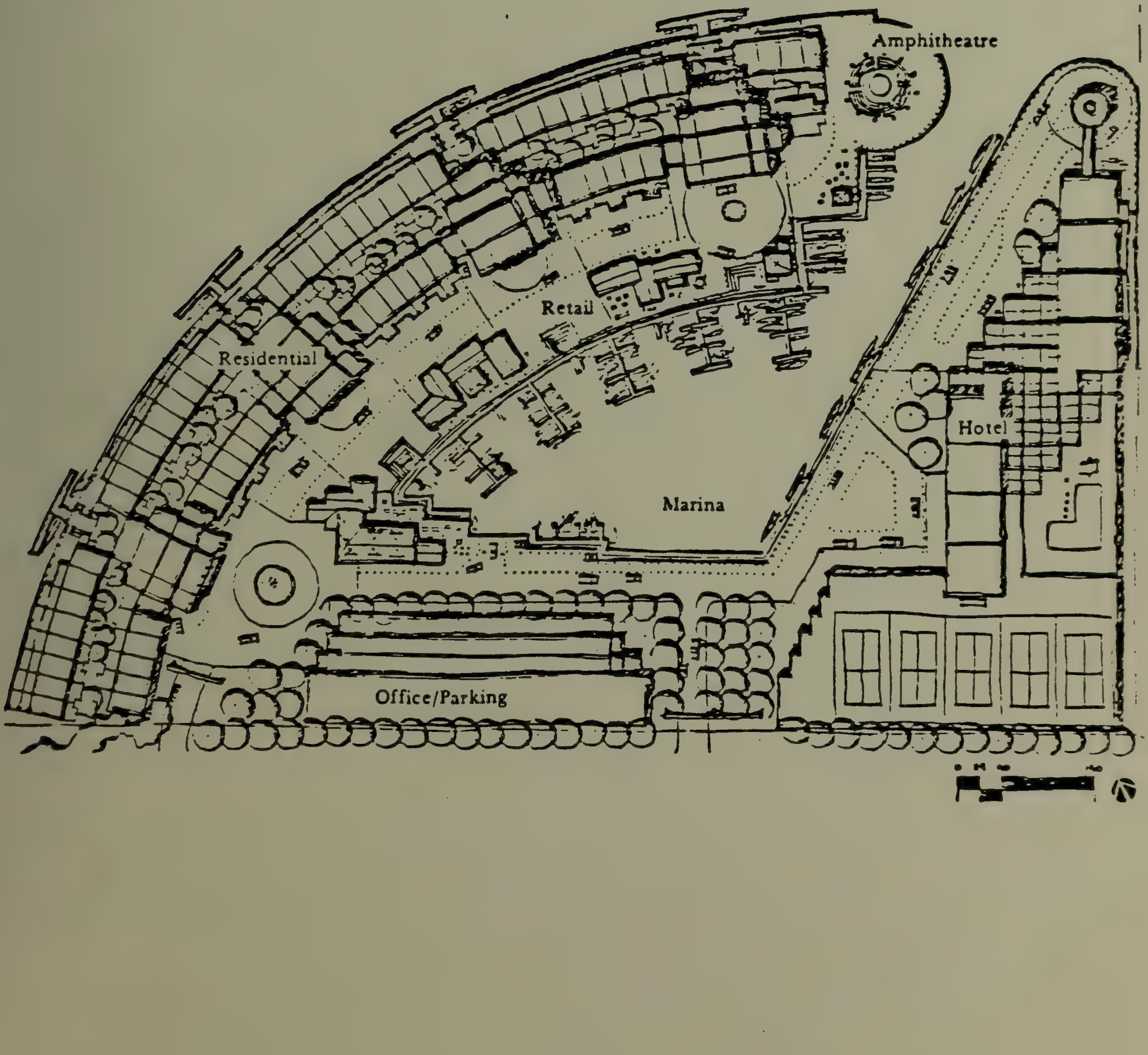
BOSTON S
MA
7.5 MINUTE



ATTACHMENT 3

REFER TO LETTER OF CLARIFICATION 3
FOR UPDATED MASTER PLAN DRAWING

SCHEMATIC DIAGRAM
PROPOSAL FOR PIERS 1, 2, 3



APPENDIX A
COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

ENVIRONMENTAL NOTIFICATION FORM

I. SUMMARY

A. Project Identification

1. **Project Name** Pier 4/Athanas Property
(to be combined with Piers 1, 2, 3)
2. **Project Proponent** Anthony's Pier 4 Inc., Anthony Athanas, Pres.
Address 140 Northern Avenue, Boston, MA 02210

B. Project Description: (City/Town(s)) Boston

1. **Location within city/town or street address** Pier 4, Northern Avenue
2. **Est. Commencement Date:** 1984 (Phase 1) **Est. Completion Date:** 1992 (to be built in phases
Approx. Cost $ 200 million **Current Status of Project Design:** 5 **% Complete**

C. Narrative Summary of Project

The proposed development of the Pier 4/Athanas Property represents an extension of the major mixed-use development project planned for Piers 1, 2, and 3 on the waterfront of Boston, Massachusetts. Conceptual planning for this portion of the development area is proceeding and the proponents, in discussion with MEPA, have determined that the whole of the development should be reviewed at one time. This Environmental Notification Form therefore represents an addition to the Piers 1, 2, 3 area (EOEA #4426) for which an EIR scope has already been established. MEPA has determined that an ENF should be filed on the Pier 4/Athanas Property to allow for public information and comment.

Located near the Fort Point Channel immediately to the east of the Piers 1, 2, 3 site, Pier 4 comprises approximately 8.9 acres of land and 7.5 acres of open water. Pier 4 is bounded to the south by Northern Avenue and to the east by the harbor inlet separating Pier 4 from Commonwealth Pier. Originally tidal flats, the area has been progressively filled since before the turn of the century. Anthony's Pier 4 Restaurant and Lounge—a major area attraction—is located at the northernmost tip of the pier, with associated at-grade parking covering the remainder of the site.

The first phase of the Pier 4 proposal entails rehabilitation of the existing pier structure, repair of the granite-block revetment (sloping embankment), and expansion of the Pier 4 Restaurant and Lounge to replace area lost in the blizzard of 1978. Later phases of the project would consist of a multi-use development to include a marina hotel (possibly including a limited number of residential units), office, commercial, structured parking, and public plaza components. The total built area of the project would not exceed 4.4 FAR.

Copies of this may be obtained from:
Name: Karen Alschuler **Firm/Agency:** Skidmore, Owings & Merrill
Address: 334 Boylston Street, Boston, MA 02116 **Phone No.** (617) 247-1070

979 **THIS IS AN IMPORTANT NOTICE. COMMENT PERIOD IS LIMITED.**
For Information, call (617) 727-5830

Listed below is a conceptual schedule of uses that may be included in the project. These areas are listed here for purposes of environmental analysis and will be revised as the project proceeds. This conceptual schedule will permit the establishment in the Environmental Impact Report of an upper limit to impacts on traffic, sewage, water, solid waste, building height, and other relevant categories regardless of the project's specific programmatic composition.

Use	Approximate Area	# Floors
Pier 4 Restaurant and Lounge	59,000 SF (13,000 SF expansion)	4
Marina Hotel	160,000 SF	5-8
Office	877,000 SF	9 & 23
Commercial	15,000 SF	1
Parking	592,000 SF	7

This project is one which is categorically included and therefore automatically requires preparation of an Environmental Impact Report: YES X NO

D. Scoping (Complete Sections II and III first, before completing this section.)

1. Check those areas which would be important to examine in the event that an EIR is required for this project. This information is important so that significant areas of concern can be identified as early as possible, in order to expedite analysis and review.

	Construction Impacts	Long Term Impacts		Construction Impacts	Long Term Impacts
Open Space & Recreation		X	Mineral Resources		
Historical			Energy Use		X
Archaeological			Water Supply & Use		X
Fisheries & Wildlife	X		Water Pollution	X	
Vegetation, Trees			Air Pollution	X	X
Other Biological Systems			Noise	X	X
Inland Wetlands			Traffic	X	X
Coastal Wetlands or Beaches			Solid Waste		
Flood Hazard Areas			Aesthetics		X
Chemicals, Hazardous Substances, High Risk Operations	X		Wind and Shadow		X
Geologically Unstable Areas			Growth Impacts		X
Agricultural Land			Community/Housing and the Built Environment		X
Other (Specify)					

2. List the alternatives which you would consider to be feasible in the event an EIR is required.

The alternatives to this proposal include:

1) No-build, with continuation of site for restaurant and parking uses.

2) Variations of this project based on different comparative intensities of use within the same total intensity of development.

*This project represents a supplement to the scope established for the Piers 1, 2, 3 EIR, EOEA #4426.

E. Has this project been filed with EOEA before? Yes ____ No X*
If Yes, EOEA No. ____ EOEA Action? ____

F. Does this project fall under the jurisdiction of NEPA? Yes X No ____
If Yes, which Federal Agency? ACOE NEPA Status? Review not yet initiated.

G. List the State or Federal agencies from which permits will be sought:

Agency Name	Type of Permit
DEQE (Waterways)	Chapter 91 - Waterways License
DEQE (Waterways)	Chapter 91 - Section 10A, Approval of Floats and Rafts
DEQE (Air Quality Control)	New Sources of Air Contaminants Review
DEQE (Water Pollution Control)	Water Quality Certification
DEQE (Water Pollution Control and MDC	Sewer Extension Permit
Mass. DPW	Traffic Control Signal Permit
ACOE	Dept. of the Army Section 10 Permit
FAA	Section 77 Federal Aviation Regulations Review
CZM	Consistency Review

H. Will an Order of Conditions be required under the provisions of the Wetlands Protection Act (Chap. 131, Section 40)?
Yes X No ____
DEQE File No., if applicable: ____

I. List the agencies from which the proponent will seek financial assistance for this project:

Agency Name	Funding Amount
None.	

II. PROJECT DESCRIPTION

A. Include an original 8½ x 11 inch or larger section of the most recent U.S.G.S. 1:24,000 scale topographic map with the project area location and boundaries clearly shown. Include multiple maps if necessary for large projects. Include other maps, diagrams or aerial photos if the project cannot be clearly shown at U.S.G.S. scale. If available, attach a plan sketch of the proposed project.

B. State total area of project: 16.4± acres
Estimate the number of acres (to the nearest 1/10 acre) directly affected that are currently:

1. Developed .... ____ acres
2. Open Space/Woodlands/Recreation 8.9±* acres
3. Wetlands .... ____ acres

* Pier & upland area
** Open water

4. Floodplain .... ____ acres
5. Coastal Area .... 7.5±** acres
6. Productive Resources
   - Agriculture .... ____ acres
   - Forestry .... ____ acres
   - Mineral Products .... ____ acres

C. Provide the following dimensions, if applicable: (See also I.C.)
Length in miles ____ Number of Housing Units ____ Number of Stories ____

	Existing	Immediate Increase Due to Project
Number of Parking Spaces	750±	884
Vehicle Trips to Project Site (ADT)	2,590± (2-way)	10,096 (2-way)
Estimated Vehicle Trips Past Project Site		
Northern Avenue West of Site Driveway	14,390 (2-way)	7,067 (2-way)
Northern Avenue East of Site Driveway	12,780 (2-way)	3,028 (2-way)

D. If the proposed project will require any permit for access to local or state highways, please attach a sketch showing the location of the proposed driveway(s) in relation to the highway and to the general development plan; identifying all local and state highways abutting the development site; and indicating the number of lanes, pavement width, median strips and adjacent driveways on each abutting highway; and indicating the distance to the nearest intersection.

Not applicable

III. ASSESSMENT OF POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS

Instructions: Consider direct and indirect adverse impacts, including those arising from general construction and operations. For every answer explain why significant adverse impact is considered likely or unlikely to result.

Also, state the *source* of information or other basis for the answers supplied. If the source of the information, in part or in full, is not listed in the ENF, the preparing officer will be assumed to be the source of the information. Such environmental information should be acquired at least in part by field inspection.

A. Open Space and Recreation

1. Might the project affect the condition, use or access to any open space and/or recreation area?
Yes _X_ No ___

Explanation and Source:

A restaurant/lounge and associated parking are currently located on the site. No recreation or open space currently exists on the site. The development, however, will provide new open space areas and public access to marina areas.

B. Historic Resources

1. Might any site or structure of historic significance be affected by the project? Yes ___ No _X_

Explanation and Source:

No structures of historical significance are known to exist on the site; however, contact with the Boston Landmarks Commission has been initiated in order to verify the absence of such historical resources.

2. Might any archaeological site be affected by the project? Yes ___ No _X_

Explanation and Source:

No archaeological sites are known to exist within the proposed project boundaries.

C. Ecological Effects

1. Might the project significantly affect fisheries or wildlife, especially any rare or endangered species?
Yes ___ No _X_

Explanation and Source:

The project will have no impact on any known rare or endangered species. The project site consists of paved land in an urban setting. With the exception of emplacing pilings to support portions of the development which extend over the near shore area west of Pier 4, the project will not entail altering the adjacent marine environment.

2. **Might the project significantly affect vegetation, especially any rare or endangered species of plant?**
Yes ______ **No** __X__
(Estimate approximate number of mature trees to be removed: __None__ **)**

Explanation and Source:

The project site consists of paved land.

3. **Might the project alter or affect flood hazard areas, inland or coastal wetlands (e.g., estuaries, marshes, sand dunes and beaches, ponds, streams, rivers, fish runs, or shellfish beds)? Yes** ______ **No** __X__

Explanation and Source:

The project site consists entirely of paved land fronted by shore protection structures. In addition, the project area is outside the limits of the 100-year flood, as mapped by FEMA (April 1, 1982).

4. **Might the project affect shoreline erosion or accretion at the project site, downstream or in nearby coastal areas? Yes** ______ **No** __X__

Explanation and Source:

The eastern shore of Pier 4 consists of a standing vertical stone seawall. This seawall extends around a portion of the northern and eastern boundaries. The remainder of the site is protected by a sloping, form-fitted granite block seawall. In each instance, the protective structures extend below the mean low water line.

5. **Might the project involve other geologically unstable areas? Yes** __X__ **No** ______

Explanation and Source:

The fill and underlying marine sediments of the site will not support standard foundations. Most new structures will, therefore, require pile or caisson footings. Samples of the fill and underlying sediments are to be analyzed for their physical characteristics before final design.

D. Hazardous Substances

1. **Might the project involve the use, transportation, storage, release, or disposal of potentially hazardous substances?**
Yes __X__ **No** ______

The construction of the project (but not its subsequent operation) will require the use of potentially hazardous materials during construction, including oil-based materials for equipment maintenance and roadway paving, and entrainment fluids for use in concrete mixing, as per typical construction practices.

The nature of the existing fill material is not known.

E. Resource Conservation and Use

1. Might the project affect or eliminate land suitable for agricultural or forestry production?
Yes ______ No __X__
(Describe any present agricultural land use and farm units affected.)

Explanation and Source:

The site is not suitable for agricultural use.

2. Might the project directly affect the potential use or extraction of mineral or energy resources (e.g., oil, coal, sand & gravel, ores)? Yes ______ No __X__

Explanation and Source:

No mineral or energy resources are known to exist on the site.

3. Might the operation of the project result in any increased consumption of energy? Yes __X__ No ______

Explanation and Source: If major new facilities are built on Pier 4, the developer will need to make arrangements with the electrical power utility, Boston Edison, to ensure that sufficient power will be supplied, and that the equipment installed (transformers, power lines, and underground ducts, etc.) will be compatible with the development. Building design standards for insulation, solar orientation, and other energy related features will ensure efficient energy use. Construction will meet all applicable codes, including the Massachusetts Energy Code requirements.

F. Water Quality and Quantity

1. Might the project result in significant changes in drainage patterns? Yes ______ No __X__

Explanation and Source:

No significant changes in drainage patterns will result from the proposed development. Relocation of local storm drains may be necessary, and the addition of storm drains for paved vehicle accessways and walkways will be required to prevent localized ponding of stormwater.

2. Might the project result in the introduction of pollutants into any of the following:

(a) Marine Waters	Yes __X__	No ______
(b) Surface Fresh Water Body	Yes ______	No __X__
(c) Ground Water	Yes ______	No __X__

Explain types and quantities of pollutants.

During construction, there will be a potential for the introduction of turbidity and suspended solids into the Harbor via site stormwater runoff. Standard construction mitigation measures will be implemented to prevent such occurrences. The method of disposal of any excess excavated fill, if any, has not yet been determined. No dredging or filling of the water area is planned.

3. Will the project generate sanitary sewage? Yes __X__ No ____

If Yes, Quantity: 211,000±* gallons per day

Disposal by: (a) Onsite septic systems .... Yes ____ No __X__
(b) Public sewerage systems .... Yes __X__ No ____
(c) Other means (describe)________________________________

*Based on standards listed in DEQE Title 5 - Sanitary Sewage, as applied to the conceptual schedule outlined in Section I.C.

4. Might the project result in an increase in paved or impervious surface over an aquifer recognized as an important present or future source of water supply? Yes ____ No __X__

Explanation and Source:

The aquifer underlying Boston, including the Harbor, is not recognized as an important present or future source of water supply. Use of Harbor waters by local industry for process supplies will not be affected by the proposed project.

5. Is the project in the watershed of any surface water body used as a drinking water supply?
Yes ____ No __X__

Are there any public or private drinking water wells within a 1/2-mile radius of the proposed project?
Yes ____ No __X__

Explanation and Source:

There are no known water supplies as described above. Drinking water is supplied via the Boston water distribution system, which is served by the Metropolitan District Commission.

6. Might the operation of the project result in any increased consumption of water? Yes __X__ No ____

Approximate consumption 243,000* gallons per day. Likely water source(s) Boston Water & Sewer Commission

Explanation and Source:

*Based on standards listed in DEQE Title 5 - Sanitary Sewage plus 15%.

7. Does the project involve any dredging? Yes ____ No __X__

If Yes, indicate:
Quantity of material to be dredged________________________
Quality of material to be dredged________________________
Proposed method of dredging________________________
Proposed disposal sites________________________
Proposed season of year for dredging________________________

Explanation and Source:

The project will require no dredging or filling of marine areas. Pilings will be located along the western side of Pier 4 to support portions of the restaurant expansion and the hotel over the near shore region.

G. Air Quality

1. Might the project affect the air quality in the project area or the immediately adjacent area?
Yes X No ____

Describe type and source of any pollution emission from the project site.

Construction activity will result in short-term air quality effects. During project operations, the primary source of air pollutants will be from increased vehicular activity at the site.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any pollution emissions caused by the project, including construction dust? Yes X No ____

Explanation and Source:

Dockside Place Condominiums - Sleeper Street
Our Lady of Good Voyage Church - Northern Avenue
Children's Museum - Sleeper Street at Congress Street

3. Will access to the project area be primarily by automobile? Yes X No ____
Describe any special provisions now planned for pedestrian access, carpooling, buses and other mass transit.

H. Noise

1. Might the project result in the generation of noise? Yes X No ____

Explanation and Source:
(Include any source of noise during construction or operation, e.g., engine exhaust, pile driving, traffic.)

Noise will be generated during the construction phase, primarily by earth moving equipment, demolition, and pile emplacement activities. Long-term noise effects will result from increased levels of vehicular activity at the site.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any noise caused by the project? Yes X No ____

Explanation and Source:

See G.2.

I. Solid Waste

1. Might the project generate solid waste? Yes X No ____

Explanation and Source:
(Estimate types and approximate amounts of waste materials generated, e.g., industrial, domestic, hospital, sewage sludge, construction debris from demolished structures.)

The project will generate up to 2,800± tons* of solid waste per year. Solid waste will be handled through a contract disposal service. Disposal of construction debris will be the responsibility of the developer and contractors.

* Based on standards given in A Primer on Industrial Environmental Impact, Michael R. Greenberg et al., Rutgers Center for Urban Policy Research, 1979, as applied to the conceptual schedule outlined in Section I.C.

J. Aesthetics

1. Might the project cause a change in the visual character of the project area or its environs? Yes X No ____

Explanation and Source:

The project will dramatically improve the visual character of the site, providing a combination of low and high-rise structures with a new marina, dock and outdoor recreation space. Other than the existing Anthony's Pier 4 Restaurant, the site is used predominantly for at-grade parking.

2. Are there any proposed structures which might be considered incompatible with existing adjacent structures in the vicinity in terms of size, physical proportion and scale, or significant differences in land use? Yes X No ____

Explanation and Source:
As one of the leading projects in the redevelopment of this section of the waterfront, this project incorporates structures and land uses that differ from current patterns in the area. However, the project is well in keeping with proposals for neighboring sites and with recent development in downtown Boston.

3. Might the project impair visual access to waterfront or other scenic areas? Yes X No ____

Explanation Because of the location of the site, views of the waterfront that will be impaired are from the warehouse and industrial buildings south of the site, and potentially from portions of Northern Avenue. On the whole, some improvement in visual access is anticipated through design and landscaping of plaza and promenade areas. Users of these areas and of the hotel, office, and restaurant structures will be offered improved views of the harbor, the skyline, and the airport.

K. Wind and Shadow

1. Might the project cause wind and shadow impacts on adjacent properties? Yes X No ____

Explanation and Source:

The site is bounded to the north, east, and west by water. Shadows created by new structures on the site will fall primarily onto the water. However, late afternoon shadows in all seasons will fall onto part of Commonwealth Pier to the east, and morning shadows at the summer and winter solstice (June 21 and December 21) will fall onto parts of Piers 1, 2, 3 and Northern Avenue. (This information is based on shadow studies of the preliminary master plan for this project area). Wind impacts on adjacent areas are unknown at this stage, and will have to be studied before more detailed design is completed.

IV. CONSISTENCY WITH PRESENT PLANNING

A. Describe any known conflicts or inconsistencies with current federal, state and local land use, transportation, open space, recreation and environmental plans and policies. Consult with local or regional planning authorities where appropriate.

No known conflicts with current governmental plans and policies exist. The project provides a new amenity through aesthetic improvement and access to the waterfront, and increases the tax base of the City.

This submission is intended to allow for planning for the full development of this waterfront parcel. Actual development will occur in phases. More detailed design information will be provided as each phase is ready for implementation.

V. FINDINGS AND CERTIFICATION

A. The notice of intent to file this form has been/will be published in the following newspaper(s):

(Name) Boston Globe	(Date) 12/15/82
South Boston Tribune	12/16/82
Boston Herald American	12/15/82

B. This form has been circulated to all agencies and persons as required by Appendix B.

Anthony's Pier 4 Inc.
Anthony Athanas Pres.

12/15/82
Date

Signature of Responsible Officer
or Project Proponent

Anthony Athanas
Name (print or type)
President, Anthony's Pier 4 Inc.
Address 140 Northern Avenue
Boston, MA 02210
Telephone Number (617) 423-6363

Karen B. Alschuler

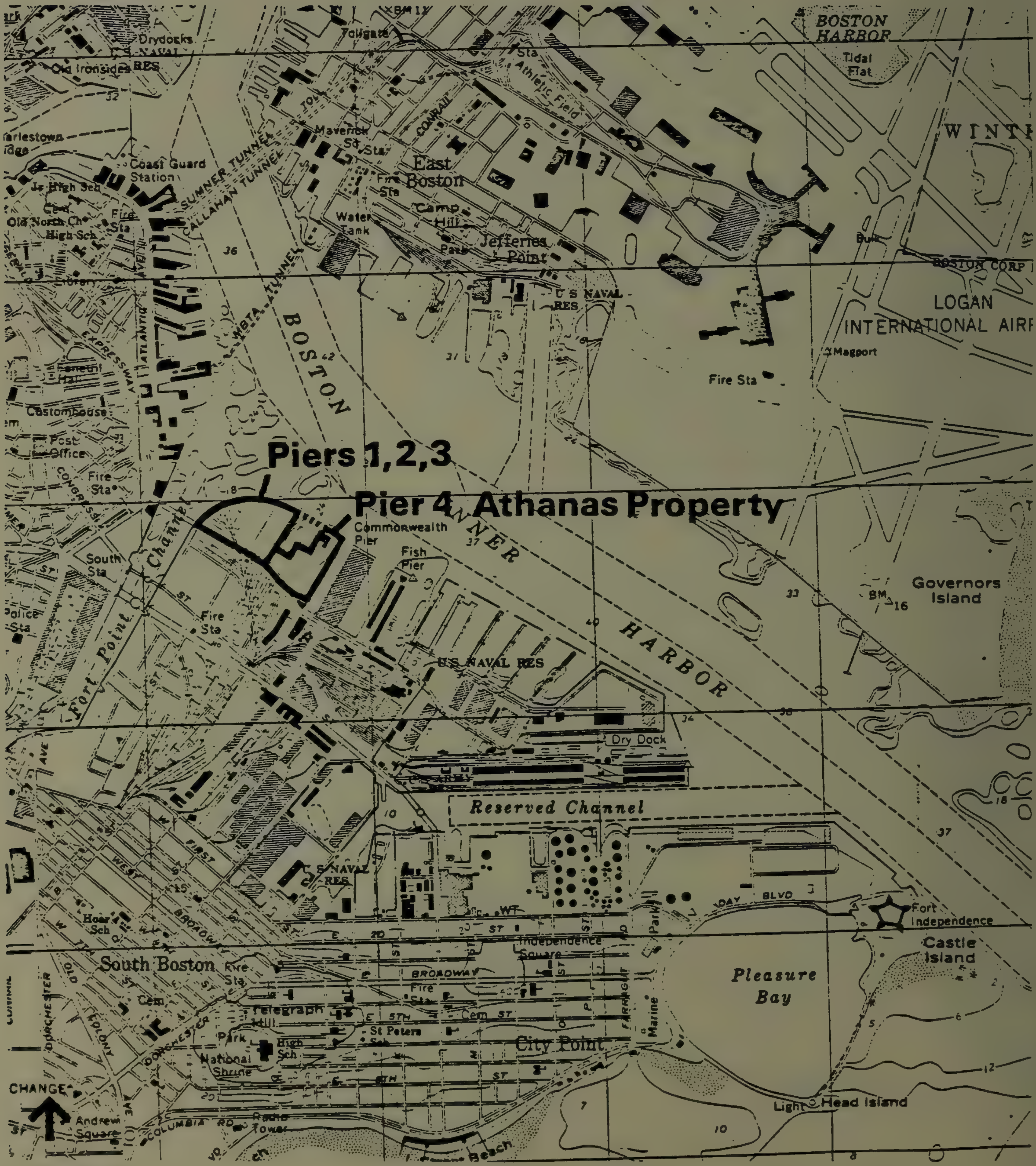
12/15/82
Date

Signature of person preparing
ENF (if different from above)

Karen Alschuler
Name (print or type)

Address Skidmore, Owings & Merrill
334 Boylston Street, Boston, MA 02116
Telephone Number (617) 247-1070

Locus Map
Pier 4 Athanas Property



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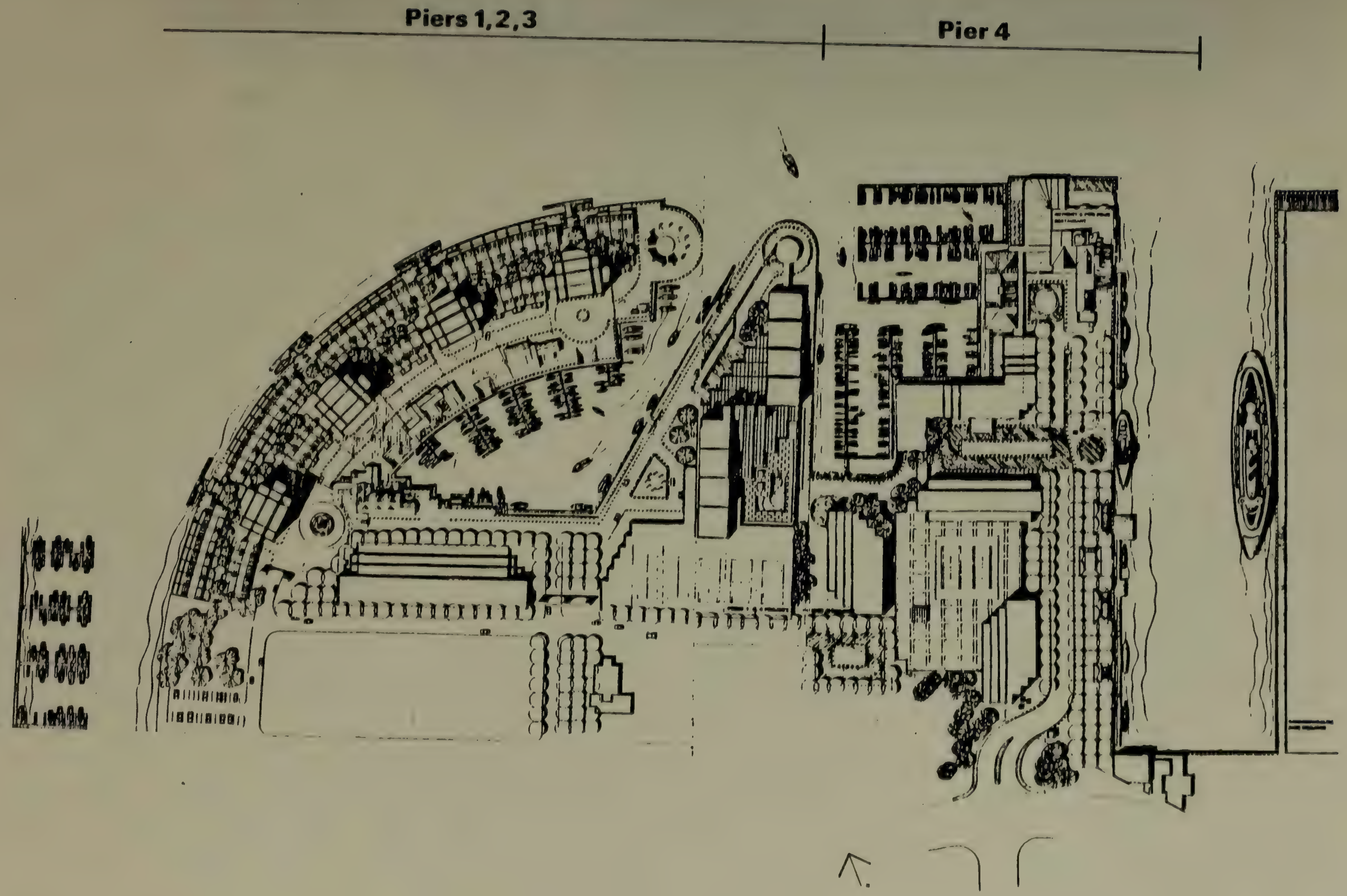

Schematic Diagram

Appendix

Combined Scope and Letters of Clarification

The Massachusetts Secretary of Environmental Affairs issued the combined scope, presented in this appendix, on January 31, 1983, in response to the Environmental Notification Forms filed with MEPA in 1982 for the Fan Pier and Pier 4 projects.

The scope is followed by correspondence clarifying issues related to the scope.

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

MICHAEL S. DUKAKIS
GOVERNOR

JAMES S. HOYTE
SECRETARY

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE COMBINED SCOPE AND ALTERNATIVES FOR THE ENVIRONMENTAL IMPACT REPORT

PROJECT NAME : Piers 1,2,3 and 4

PROJECT LOCATION : South Boston

EOEA NUMBER : #4426/4584

PROJECT PROPONENT : HBC Associates and Anthony's Pier 4, Inc.

DATE NOTICED IN MONITOR : May 21, 1982 and December 22, 1982

Pursuant to M.G.L., Chapter 30, Section 62A and 10.04(9) of the Regulations Governing the Implementation of the Massachusetts Environmental Policy Act, I hereby determine that the above referenced project does require the preparation of an Environmental Impact Report.

The EIR should be organized according to the format in MEPA regulation 10.05 and should contain a copy of the following Scope of Work and comments on the ENF.

WATER QUALITY

1. Dredging, Filling and Dispositon of Spoils
   - A. Evaluate the applicability of Coastal Wetlands Regulations 310 CMR 10.25 (3),(4),(5),(6) and regulations under Chapter 91 to the proposed dredging and filling.

B. Parts.I and II of the Standard Application Form for Dredging should be completed in consultation with the DEQE Division of Water Pollution Control, including chemical analysis for PCB's, mercury and lead. Zinc should be added to the list of chemicals to be analysed. Except for detailed design and engineering plans, the completed form, along with the results of a grain size analysis of dredge and fill materials, should be included in the EIR.

C. Other aspects of the proposed dredging and filling operations should be thoroughly examined :

(1) Need and justification for filling

The ENFs for the two combined projects propose construction of two hotels, one of which may require filling of Boston Harbor. In order to document the overriding public need to fill the harbor for a non-waterdependent use, the EIR should analyze the market justification for the large amount of hotel space proposed on the site.

(2) Amount and approximate location of proposed dredging and filling
(3) Method of dredging, type of equipment and proposed schedule
(4) Recommended disposal site for the dredged material
(5) Special methods to minimize turbidity
(6) Long-term impact on benthic life and proposed mitigation
(7) Effects on the harbor from the proposed decking and development on piles

D. The following factors should be evaluated with respect to maintenance dredging of the proposed marina after development :

(1) Two alternative depths of each proposed marina, the estimated siltation rate and the frequency of dredging which will be required to maintain the marina depth
(2) Cost and resonsibility for the maintenance dredging
(3) Method
(4) Disposition of the dredged material

E. Fill from the MBTA Orange Line reconstruction project was recently stockpiled on the Athanas land. The Draft EIR should describe the disposition, present location and volume of such material.

****

2. Marina : Describe and show on a plan the proposed marina. The marina evaluation should focus on the following aspects :

A. Characteristics and water dynamics of the cove

(1) Surface area, existing and proposed depth and bottom contours
(2) Tidal flushing and scouring characteristics
(3) Proposed form of shore protection and alternative forms which could be considered.

B. Boating facilities

(1) Number and type of tie-up facilities
(2) Method of securing floats
(3) Pump-out facilities
(4) Facilities for supplying gas and oil, and relevant licensing requirements
(5) Waiting area and other facilities for public transportation and tour boats
(6) Measures to minimize contamination of the harbor from boating activities.

The EIR should evaluate an alternative marina configuration with two outlets, comparing it to the proposed single-outlet marina in terms of tidal flushing and scouring, as well as other potential advantages and disadvantages.

3. Inner Harbor

   A. Evaluate the impacts of the proposed filling on the tidal flushing, scouring, navigability, benthic life in the adjacent harbor area, and on the existing fishing industry; propose methods to minimize those impacts.

   B. Indicate on a plan the depth and bottom elevation for the existing harbor and the proposed channel connection.

   C. Describe the type of bulkhead proposed for the harbor shoreline.

   D. If filling of the harbor is proposed, the proponent should work with the DEQE Division of Water Pollution Control to develop a program for monitoring turbidity. The program should be worked out during the EIR process and described in the EIR.

4. 100-year Flood Level

   A. Define the lowest floor elevation of the proposed buildings in relation to the 100-year flood elevation.

   B. Identify requirements of the Federal Emergency Management Act which apply to the proposed development.

****

TIDELANDS AND PUBLIC PURPOSES

The use of tidelands in the Commonwealth is subject to the condition that public purposes be served. In order to establish the degree of public interest in the filled land comprising the site and to provide information necessary to the granting of a Chapter 91 Waterways license, the EIR shall:

1. Provide a summary of title documents, permits, grants and licenses previously issued for the locus and of legislative grants obtained; highlight the purpose for the instruments and any limitations on their use; show, on a scaled plan, areas subject to any past grants, licenses or permits and the actual meets and bounds of the site as it exists today; discuss how the proposed project is or is not consistent with the purpose and limitations of the above-mentioned instruments; and in an appendix provide copies of all instruments which represent grants or authority to occupy tidelands;

2. Present the history of previous filling or dredging on site and identify, on a scaled plan, areas, if any, where fill was placed without authorization;

3. Describe the history of the maritime activities at the site.

****

PUBLIC ACCESS

The potential for providing public access to the site should be evaluated in a number of forms and combinations, including :

1. Continous physical landside access to the waterfront perimeter;
2. View corridors to the harbor from existing Northern Avenue and from public open areas on the site;
3. Walkways from the street to the proposed marina, hotel, open areas and waterfront;
4. Water access to the marina (including slips, docking and landing facilities) for public water transportation and private transient vessels;
5. Boating needs met by the marina
6. Compatibility (access, services, physical capability) of the proposed development with potential future public marinas on (a) the northwest bank and (b) the southeast bank of the Fort Point Channel mouth;
7. Provision for continuation of the tour boat, lobster operations and any other existing maritime uses currently conducted on site;
8. Safety ladders around the bulkhead.

Where appropriate, the landscaping, design and materials for the proposed access ways should be specified. Access alternatives should be illustrated in plans and sketches.

****

VISUAL IMPACTS

1. Describe the visual features of the project as proposed, using layout plans to illustrate :
    - A. building dimensions and configurations
    - B. setbacks from water and streets
    - C. open areas

2. Use sketches, as well as verbal descriptions, to depict :
    - A. the relative height, design and materials for the buildings
    - B. proposed landscaping and lighting treatment
    - C. views of the following :

C. Other aspects of the proposed dredging and filling operations should be thoroughly examined :

- (1) Need and justification for filling

  The ENFs for the two combined projects propose construction of two hotels, one of which may require filling of Boston Harbor. In order to document the overriding public need to fill the harbor for a non-waterdependent use, the EIR should analyze the market justification for the large amount of hotel space proposed on the site.
- (2) Amount and approximate location of proposed dredging and filling
- (3) Method of dredging, type of equipment and proposed schedule
- (4) Recommended disposal site for the dredged material
- (5) Special methods to minimize turbidity
- (6) Long-term impact on benthic life and proposed mitigation
- (7) Effects on the harbor from the proposed decking and development on piles

D. The following factors should be evaluated with respect to maintenance dredging of the proposed marina after development :

- (1) Two alternative depths of each proposed marina, the estimated siltation rate and the frequency of dredging which will be required to maintain the marina depth
- (2) Cost and resonsibility for the maintenance dredging
- (3) Method
- (4) Disposition of the dredged material

E. Fill from the MBTA Orange Line reconstruction project was recently stockpiled on the Athanas land. The Draft EIR should describe the disposition, present location and volume of such material.

****

2. Marina : Describe and show on a plan the proposed marina. The marina evaluation should focus on the following aspects :

A. Characteristics and water dynamics of the cove

- (1) Surface area, existing and proposed depth and bottom contours
- (2) Tidal flushing and scouring characteristics
- (3) Proposed form of shore protection and alternative forms which could be considered.

B. Boating facilities

- (1) Number and type of tie-up facilities
- (2) Method of securing floats
- (3) Pump-out facilities
- (4) Facilities for supplying gas and oil, and relevant licensing requirements
- (5) Waiting area and other facilities for public transportation and tour boats
- (6) Measures to minimize contamination of the harbor from boating activities.

Indicate locations where wind velocities and gusts would render incompatible the outdoor activities described, and identify locations where wind conditions would be conducive to outdoor activities.

2. Conduct a wind tunnel stress analysis for buildings on the site which may be subject to pressure either from direct winds or indirect suction effects created by the proposed development. The analysis should be based on the maximum load which the buildings can withstand. The load test can be conducted either at the time of the initial wind tunnel test or, if more useful, at a later stage prior to final design. If it is more practical to conduct stress analysis after the preferred alternative is selected, the proponent should state in the Final EIR when he intends to conduct the stress analysis.

3. Determine, based upon wind speed and direction probabilities, where mitigation will be useful. Evaluate alternative massing, building heights and designs which minimize adverse wind impacts identified by the wind tunnel tests, and propose additional measures to reduce the wind impacts of the project. If mitigation would divert wind to other areas, evaluate the potential future use of those areas.

4. The proponent may present the results of the wind tunnel analysis as a supplement to the Final EIR, provided that the Supplement is filed for MEPA review more than 30 days in advance of application for permits. This will allow for modification of the project if review of the wind analysis identifies severe impacts. Discussion of wind impacts in the Draft EIR may be limited to identifying potential problem areas on land and water and defining the parameters of the detailed wind study.

****

TRAFFIC ANALYSIS

The development is likely to produce significant traffic impacts and have important ramifications for traffic circulation on both sides of Fort Point Channel. Detailed calculations should be included as an appendix.

1. Traffic Study Area

The scope of the study should include :

A. Northern Avenue to the ramp merge with the Central Artery and including the U-turn movement from Atlantic Avenue to Purchase Street, at High Street
B. Congress Street, to the ramp merge on the Central Artery
C. Summer Street from Dewey Square to L Street

(Continued)

D. L Street to Day Boulevard
E. Day Boulevard to Kosciuszko Circle
F. Andrew Square to West Fourth Street, including the
    interchanges with the Southeast Expressway
G. Broadway, specifically the two intersections under the
    Southeast Expressway
H. Columbia Road, Exit #17 on the Southeast Expressway

The various travel routes to and from the site should be assessed in the event that Northern Avenue. Congress Street and Dewey Square become heavily congested. The Expressway, northbound and southbound, and each route identified above, should be assessed for existing and future congestion at peak periods, volume/capacity ratio, travel speeds and likely utilization for access. Typical existing peak period congestion queuing on the Expressway should be described, as well as incremental impact of this project. Key intersections at the end or beginning of Expressway ramps should be assessed, including the U-turn movement at High Street.

Traffic congestion on the Southeast Expressway currently leads to shortcutting through South Boston to avoid the Expressway bottlenecks. Traffic generated by the project is likely to compound this existing problem. The EIR should identify the South Boston streets which might be impacted. It should then propose, as mitigation, a traffic control plan which would reduce the incentive to detour through South Boston. The advantages of such a plan to reduce through traffic on South Boston streets may have undesirable side-effects : the one-way streets, traffic signal timing and turning prohibitions may create added inconveniences, detours and delays for South Boston residents. These, too, should be identified and assessed.

A number of traffic inconveniences to South Boston residents already exist, and the EIR should analyze the possibilities and effects of remedying them as part of the traffic control plan. Examples of existing local problems and inconveniences are :

1. the Summer Street railroad bridge is closed to public buses;
2. right turns from West Broadway onto Dorchester Avenue are prohibited
3. the Summer Street bridge over the Reserve Channel is closed to all northbound traffic (from South Boston to South Station) necessitating a detour
4. congestion at Andrew Square
5. truck traffic on Old Colony Avenue, Preble Street and Day Boulevard

2. Time periods of analysis should include :

   A. existing conditions, preferably the base condition assumed in the Commonwealth Pier EIR
   B. for phase one, the 1987 base condition (no build), with a description of the development conditions assumed
   C. the 1987 condition with construction of phase one of the project.
   D. Design base year (no build) for completion of the entire project, with a description of the development conditions assumed
   E. Design year, after entire project completion

3. Development Assumptions

   An essential element of the traffic analysis is that a reasonable level of near-term development be included in a comprehensive traffic analysis, including :

   A. the proposed development of Commonwealth Pier
   B. proposed renovation and increased utilization of the Boston Marine Industrial Park and the former Boston Army base (EDIC)
   C. new development in the South Station area, including both the transportation center and the Rose Building at Dewey Square

   For this EIR analysis, traffic generated by development sites should be estimated based on available EIR documentation. The direction and distribution of traffic may vary from project to project. An allowance should be made for traffic from rehabilitation of existing buildings.

   The analysis should assume a new fixed-span Northern Avenue Bridge. If prior to completion of the Final EIR, state or Federal regulatory agencies determine that a movable span is necessary, this scope will be modified to evaluate the impact of a moveable span. If the bridge is not rebuilt prior to completion of either phase one or all of the Piers project, describe generally the effects on the project.

4. Vehicular and Pedestrian Circulation Patterns

   A. The EIR should provide a description and plans of existing and proposed neighborhood streets, showing vehicular and pedestrian circulation patterns. It should identify any assumptions involving the use of privately-owned land and evaluate potential alternative routes should the land not become available.

   B. The report should describe the proposed vehicular, bicycle and pedestrian access to the site, indicating how the proposed access ties into neighborhood circulation patterns and how it connects to interior roadways and walkways on the site.

C. The report should assess the need for the proposed redirection of the old Northern Avenue and its effects on traffic flow in the immediate and neighboring areas, particularly on truck traffic.

D. The report should address the needs of handicapped persons in considering the design of pedestrian ways.

5. Mitigation

The following measures to reduce traffic impact of the project, along with other measures described above or which the proponent may propose, should be thoroughly evaluated :

A. public bus service between the site and South Station/downtown

B. public water transportation between the site and downtown Boston/ Logan Airport

C. other public and private ridesharing options, such as water taxi, shuttle bus and limousine service from the proposed hotel

D. incentives to encourage employee use of public transportation and ridesharing options, including a limited number of parking spaces; parking policies on internal streets; parking fee structure; and carpool programs

E. support facilities (such as grocery stores, post office) for residents on the site

****

PARKING

1. Specify the number of existing parking spaces on the site, identify the needs which the lot fulfills, and evaluate the impact of the displacement of current users.

2. Estimate, by project element for all proposed public and private uses, the parking demand after development, and indicate how the projected demand will be accomodated.

3. Evaluate the use of off-site parking facilities and potential sharing of parking space with other facilities in the area which have different time and use patterns. The goal is to maximize the use of valuable waterfront land for active uses, as opposed to parking.

****

AIR QUALITY ANALYSIS

1. The proponent should undertake a microscale analysis to determine potential CO, NO_x, and TSP levels associated with traffic generated during operational phases of the project. The analysis years and the development assumptions for Air Quality analysis should coincide with those of the traffic study. The study methodology, the intersections to be analysed, and the sensitive receptors should be determined in consultation with DEQE and MEPA, based upon findings of the traffic analysis, prior to preparing the microscale analysis. The analysis should focus on worst case conditions identified in the traffic study, and should determine 1-hour and 8-hour CO levels.

2. The air quality analysis should take into account potential queuing in the proposed parking garages and should evaluate the proposed venting systems of the garages, and their impact on residents and pedestrian areas of the site.

3. The report should identify any stationary sources of air emissions to be installed and operated on the site, describing the type of equipment, its size and any permits or approvals required.

****

NOISE

Noise impacts of the project fall into two categories : (1) vehicular noise resulting from the diversion of traffic through local South Boston streets, and (2) aircraft noise effects on residents and outdoor activities on the project site.

1. The EIR should evaluate the impact of vehicular noise on identified sensitive receptors by comparing existing levels, 1987 levels after completion of Phase I, and design year levels, using worst-case traffic conditions for the three analysis years. Noise levels should be measured in terms of L_{dn} and L_{10}.

2. The proponent should measure existing aircraft noise levels on the site in terms of L_{dn}, L_{10} and L_{max} and evaluate the compatibility of the proposed residential housing and outdoor activities with the measured noise levels.

3. The report should evaluate noise attenuation measures for the areas determined to be adversely affected by noise levels from either of the two categories.

****

SEWAGE DISPOSAL

1. Describe the existing sewerage infrastructure between the project site and the ultimate treatment and disposal site. Evaluate the adequacy of the existing infrastructure to handle sewage flows generated by the proposed development, taking into account the same development assumptions as were made for the traffic analysis.

2. Describe the frequency of overflows into the harbor under existing conditions and evaluate the impact of sewage generated by the proposed development on harbor pollution and on beaches, resulting from combined sewer overflows during dry weather and during storms.

3. Identify improvements which would be required to adequately handle the projected flows, and relate the necessary improvements to future plans of the Boston Water and Sewer Commission and the MDC.

4. Propose mitigating measures, including holding tanks and controls, point source treatment, water recycling and water conservation, and evaluate their effects.

5. Evaluate the following alternatives :

   A. a project phased to coincide with future improvements to sewage treatment facilities;

   B. an alternative which does not increase harbor pollution.

****

OTHER UTILITIES

1. Describe the existing water supply intrastructure and evaluate its adequacy to supply the project, taking into account the previously-made development assumptions. Identify improvements to the existing system required to accomodate the proposed development. The effects of water recycling and conservation measures evaluated in the previous section may be applied to reduce the water consumption figure.

2. Describe the proposed drainage facilities and evaluate measures to prevent hydrocarbons from the site's parking areas and roadways from contaminating the harbor.

ENERGY USE

1. The EIR should clarify whether Boston Edison can supply sufficient power to meet the energy demands of the combined projects, whether alterations to the distribution system will be necessary and if so, what will be the effects of those alterations.

2. Evaluate alternative energy systems in terms of their use of renewable resources and their potential for energy conservations. Life-cycle costing, which takes into consideration all energy-related costs over the life of a building, is recommended by the BRA and may be included in the report for the proposed buildings at the discretion of the proponent (optional).

3. The report should propose measures to conserve energy. These measures may include use of outside air for cooling, use of solar energy, use of operable windows, heating zones and others.

****

CONSTRUCTION IMPACTS

1. The construction impact analysis should begin with a timetable of the proposed sequence and and scheduling of construction of major elements of the project, followed by a discussion of proposed construction methods and techniques, the routing of construction materials and equipment to and from the site and the location where they will be stored.

2. The report should evaluate potential construction-related impacts due to traffic, noise (from traffic and other construction activities), water quality and air quality, identifying sensitive receptors. Since either high turbidity levels or high particulate levels would constitute a problem for the nearby fishing industries, they should be considered a sensitive receptor for purposes of water quality and air quality. A general discussion of construction impacts, including possible alternatives is acceptable.

3. Identify the method of pile emplacement and provide a plan showing the number and location of piles.

4. The EIR should identify any structures to be demolished and determine whether they will be subject to DEQE Regulations 310 CMR 7.02, 7.09, and 7.15, which apply to structures containing friable asbestos.

5. The relationship of the proposed development to other near-term construction projects in the vicinity of the project should be assessed. Construction schedules for the Northern Avenue Bridge and the five developments assumed for the traffic analysis should be presented in the EIR and periods where their construction coincides with that of the proposed development should be noted. Where overlaps with the proposed development occur, the combined impacts should be evaluated.

6. The report should evaluate measures to minimize construction impacts, including erosion controls along the waterfront perimeter to control waterfront pollution from upland construction activities, the transport of construction materials to the site by barge and hourly wetting down of the construction road to minimize particulates, pursuant to DEQE Regulation 7.09.

****

ALTERNATIVES TO THE PROPOSED PROJECT

The EIR should evaluate the following three major alternatives in the same manner and depth as the proposed development. The height, mass, location and setbacks should be specified for each conceptual alternative evaluated in the Draft EIR to permit informed review. It is important to present a visual rendering of each alternative, in combination with a verbal description. MEPA appreciates the fact that precise details cannot be furnished early in the design stage; however, the Draft EIR should avoid undue generality in its treatment of the alternatives. The report should assess the environmental costs and benefits of each alternative and should note other significant advantages and disadvantages. It should describe the Chapter 91 licenses needed for each alternative.

1. An alternative configuration which uses the existing land, eliminating the necessity of filling the harbor.

2. An alternative which requires no net fill

3. One or more lesser-scale alternatives than the proposed development, particularly in terms of building height, with emphasis on compatibility with existing harborside development.

Throughout the body of the EIR, the study of alternatives has been required to address specific impacts of the project. These sub-alternatives include :

1. a marina with two outlets
2. alternative combinations for pedestrian, vehicular and water access to the public, including the provision of continuous public access along the waterfront
3. alternative alignments and building heights to maximize views of the harbor and the downtown skyline
4. an alternative to increase visual accessibility to the site from Northern Avenue
5. alternative massing to minimize wind impacts
6. alternatives to minimize adverse impacts of sewage disposal
7. alternative hotel sizes and locations, as well as an alternative which eliminates at least one of the proposed hotels.

Conclusions drawn from the examination of the more numerous impact-related sub-alternatives are equally important and should not be overlooked or omitted in evaluating the three major alternatives. These earlier findings should, to the extent feasible, be applied in developing the major alternatives, in modifying the proposed development or, where appropriate, in presenting sub-alternatives, designed to minimize specific impacts, as variations of the major alternatives.

****

MISCELLANEOUS COMMENTS

The EIR should list all licenses, permits and approvals required, and should identify funding sources for the project. The proponent has agreed to hold additional public meetings prior to filing of the Draft EIR, as requested by South Boston residents and the Coastal Zone Management Program. The proponent should notify the MEPA office when the proposal is sufficiently advanced to form a basis for discussion. CZM has offered to assist in arranging the meetings.

The Draft and Final EIR should be circulated to all who participated in the scoping process and all permit-granting agencies.

1-31-83
DATE

James Hoyte
JAMES S. HOYTE, SECRETARY

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CABLE HAFIS WSH
TELECOPIER (202) 393-4497

August 10, 1982

Ms. Sandy Utyerhoeven
MEPA
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA

Re: Piers 1, 2, 3 - EOEA No. 4426

Dear Sandy:

I have reviewed the June 23, 1982 scope for the Piers 1, 2, and 3 proposal in light of our meeting on July 28, 1982 with you and Sam. On behalf of the proponent we request clarifications of the following topics:

A. Water Quality.

1. In Sections 1B and 1C, we have been asked to complete Parts I and II of the Standard Form for dredging and to "thoroughly" examine proposed dredging and filling operations including the "amount and precise location" of proposed activity, the methods and equipment, and the disposal sites to be used.

Having reviewed the requirements of Parts I and II, we feel that the issues raised can be responded to in the Draft EIR, but that the detailed design and engineering required for the requested plans and sections in a full submittal of the forms should await a later, more precise design of the project. Results of the chemical analysis for PCB's, mercury, lead, and zinc as well as a grain size analysis, would be included in the EIR as requested in the scope.

Likewise, in response to 1C of the scope, we would provide as much detail as possible at this stage of conceptual design with the objective of establishing parameters and guidelines for any dredging which will occur on the site.

2. Similarly, with respect to the marina, as the exact size and design of the marina has not yet been resolved, we would

propose to supply approximate characteristics within a range of alternatives.

B. Visual Impacts.

1. Section 1 calls for a description of visual features including building dimensions and configurations, setbacks and open areas. We propose to respond in a general way showing conceptual design alternatives and their impacts on these features.

2. In subparagraph 2, we similarly propose a general discussion of height, design, materials, landscaping and lighting without specific detail as the designs have not been resolved at this stage in the proposal.

C. Wind Impacts.

As we discussed, the wind tunnel modeling will be useful only when specific design features have been determined for each element in the project. We propose such modeling be done in a supplement to the Final Environmental Impact Report when the design for the first building element has been determined on a preliminary basis.

D. Traffic Analysis.

Paragraph 3 indicates that we should indicate how each of the proposed third harbor tunnel alternatives would affect the project. We propose to do so through a qualitative analysis of changes in access routes to our site as a result of the third harbor tunnel options. No detailed capacity analysis would be performed.

E. Construction Impacts.

Paragraph 1 calls for a description of the proposed sequence and scheduling of construction of major elements of the project. As the development schedule has not yet been determined, we propose to discuss this in a general way including possible alternatives.

F. Alternatives.

As with other comments referred to above, the alternatives will be discussed throughout the text of the report where appropriate and will be considered in general terms appropriate to this stage of the conceptual design.

A set of alternatives which respond to the characteristics of the three major alternatives listed in the scoping memo will be developed and reviewed with MEPA. The six sub-alternatives will be addressed in relation to the appropriate impact categories.

Thanks very much.

Sincerely yours,

Robert Tuchmann

cc: Mr. Richard L. Friedman
Ms. Carmine Cerone
John D. Hamilton, Jr., Esq.
Ms. Karen Alschuler√

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

MICHAEL S. DUKAKIS
GOVERNOR

JAMES S. HOYTE
SECRETARY

April 5, 1983

Karen Alschuler, Associate Partner
Skidmore, Owings & Merrill
334 Boylston Street
Boston, MA 02116

Re: EOEA #4426/4584
Piers 1, 2, 3 and 4, Boston

Dear Ms. Alschuler:

On March 29, 1983, members of the MEPA and CZM staffs met with you and other members of the Piers 1, 2, 3 and 4 development team. The meeting was held at your request to discuss and clarify certain requirements of the expanded Scope, which was broadened to combine the impacts of Pier 4 development with those of Piers 1, 2 and 3. This letter constitutes my response to your request for clarification of the items set forth in your March 17, 1983 letter and discussed at the March 29 meeting.

Water Quality

1. The purpose of paragraph 1.C.(1) of the Scope is to determine whether the proposed filling of Boston Harbor for a non-water dependent use can be justified by documenting an overriding public need. The Scope requires market justification of the proposed hotels. Since, under some alternatives, the proposed hotels may not be situated on the filled area, you proposed broadening the Scope to include justification of all proposed non-water dependent uses, including hotels. This approach is acceptable.

2. The reasons for requiring evaluation of two alternative marina depths (paragraph 1.D.(1) of the Scope) are two-fold:

a. to obtain information on siltation rates and frequency of maintenance dredging; and

b. to determine the size of boats which the marinas will accomodate and the extent to which the proposed marinas will be able to replace existing marina facilities in Fort Point Channel which are likely to be eliminated by construction of the new Northern Avenue bridge.

As we discussed, the above objectives could be satisfied equally well by evaluating only one depth for each marina if the information provided includes the existing marina depth, proposed depth, rate of siltation and frequency of maintenance dredging for the proposed depth; and if the proposed marinas are sufficiently deep to accommodate a majority of the boat sizes which currently use facilities in the Channel area.

Traffic Analysis

1. The term Expressway, as used in the MEPA Scope, does warrant clarification. The extent of the expressway study area differs for the A.M. and P.M. peak periods, because congestion points and queuing are different.

2. During the morning peak, both sides of the Central Artery normally flow fairly freely, due to the southbound "choke point" at the Charles River bridge, and northbound choke point in the vicinity of the Turnpike interchange and South Station tunnel. The EIR should indicate the additional vehicles approaching the Charles River bridge choke point in the A.M. peak for the Build and No Build conditions. This interchange area is proposed for reconstruction, and precise traffic and capacity analysis is not possible at this time.

The northbound congestion for traffic approaching from the south should be based on existing capacity limitations and queuing delays. Because current congestion defines capacity, further capacity analysis of the mainline expressway sections is not necessary. However, an estimate and assessment should be provided of the additional traffic during the peak hour adding to the existing expressway queue and adding to local streets, particularly those South Boston streets within the study area indicated in the original MEPA scope.

3. During the P.M. peak, both sides of the Central Artery are badly congested. Northbound traffic leaving the site will be entering the expressway and encountering backed-up lines of vehicles. Estimates of the increased volumes of vehicles entering this congested traffic stream and the consequences should be provided.

The Southbound traffic is subject to several slowdowns between the Sumner and Callahan tunnels and Columbia Road. As in the A.M. peak, an estimate and assessment should be made of additional traffic contributing to the expressway queue and adding to local streets.

4. The projected traffic results should be presented in terms of real-world limiting factors, such as on-site parking, and roadway capacity - with effects of travel routes, times, modes and delays. The on-going work by CTPS to describe bottlenecks, queues and delays may be utilized in the EIR where appropriate.

5. The Scope (page 7) cited five problem areas in South Boston as examples of local inconveniences, not as areas to be studied in the EIR. The purpose of including these examples in the Scope was

1. to alert the consultant to the type of local problems which exist and which can occur as side-effects of measures taken to prevent through-traffic from detouring via South Boston;

2. to determine whether local problems will be exacerbated by the project;

3. to determine whether local problems can be alleviated by measures which minimize traffic impacts of the project.

Air Quality Analysis

Your interpretation of the air quality requirements in the Scope is correct. As your letter states, the microscale analysis is intended to determine carbon monoxide levels. DEQE's concerns with respect to total suspended particulates (TSP) are mainly related to impacts of construction. These can be addressed by responding to the requirements in the Construction Impacts of the Scope. After further discussions with DEQE concerning the need for total burden analysis of oxides of nitrogen (NO_x), I have concluded that this analysis need not be included in the EIR. Because NO_x is primarily an airport-related pollutant, it seems unreasonable to require an areawide NO_x analysis of an individual developer. As you are probably aware, NO_x levels are currently monitored by Massport at Logan Airport.

Sewage Disposal

Data on the frequency of sewage overflows into Boston Harbor should be based on available information from the MDC and the Boston Water and Sewer Commission.

Alternatives to the Proposed Project

Item 7 of the section on sub-alternatives intends that the EIR evaluate an alternative which includes only one hotel for the total project, that is, for all phases of the Piers 1, 2, 3, 4 development (not for Phase I only, as your letter suggests). If various configurations for massing and location of hotel facilities are analyzed in response to earlier portions of the Scope, the analysis of various sizes and locations need not be repeated.

Thank you for your cooperation in clarifying these matters.

Sincerely,

James Hoyt

James S. Hoyte
Secretary

JSH/elk
cc: John Pike (Ropes and Gray)
Edna Travis (Ropes and Gray)
Richard Hangen (Vanasse-Hangen Assoc.)
Richard F. Delaney (CZM)
Robert Tuchman (Hale and Dorr)

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May 22, 1985

Sam Mygatt, Esq.
MEPA Unit
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Re: EOEA Nos. 4426/4584 --
Piers 1, 2, 3 & 4, So. Boston

Dear Sam:

Reference is made to the Secretary's Certificate on the combined scope for the Piers 1, 2, 3 and 4 Project and our meeting at the BRA on April 23, 1985.

This letter will confirm our discussion at our meeting that as a result of refinements to the project program, a new master plan has been prepared for Piers 1, 2 and 3 by Cesar Pelli Associates. It was the model of this master plan that we studied at the BRA.

Although the configuration of the proposed structures and uses has been altered from the master plan reflected in the ENF, the project still consists of a major hotel, a residential component, office buildings, a garage, a marina and public open spaces. A copy of the schematic diagram of the Pelli master plan is attached.

Accordingly, as the changes to the design were not significant in terms of environmental impact and since the scope of the environmental impact report which we are preparing is all encompassing, you agreed that we did not need to submit a notice of proposed project change for the new master plan. In addition, we noted that the new design was being presented to all of the state and local agencies as well as to the community so that agency and public discussion is being focused on the new design.

We are proceeding with the preparation of the EIR but will be

LETTER OF CLARIFICATION - 3
WITH UPDATED MASTER PLAN DRAWING

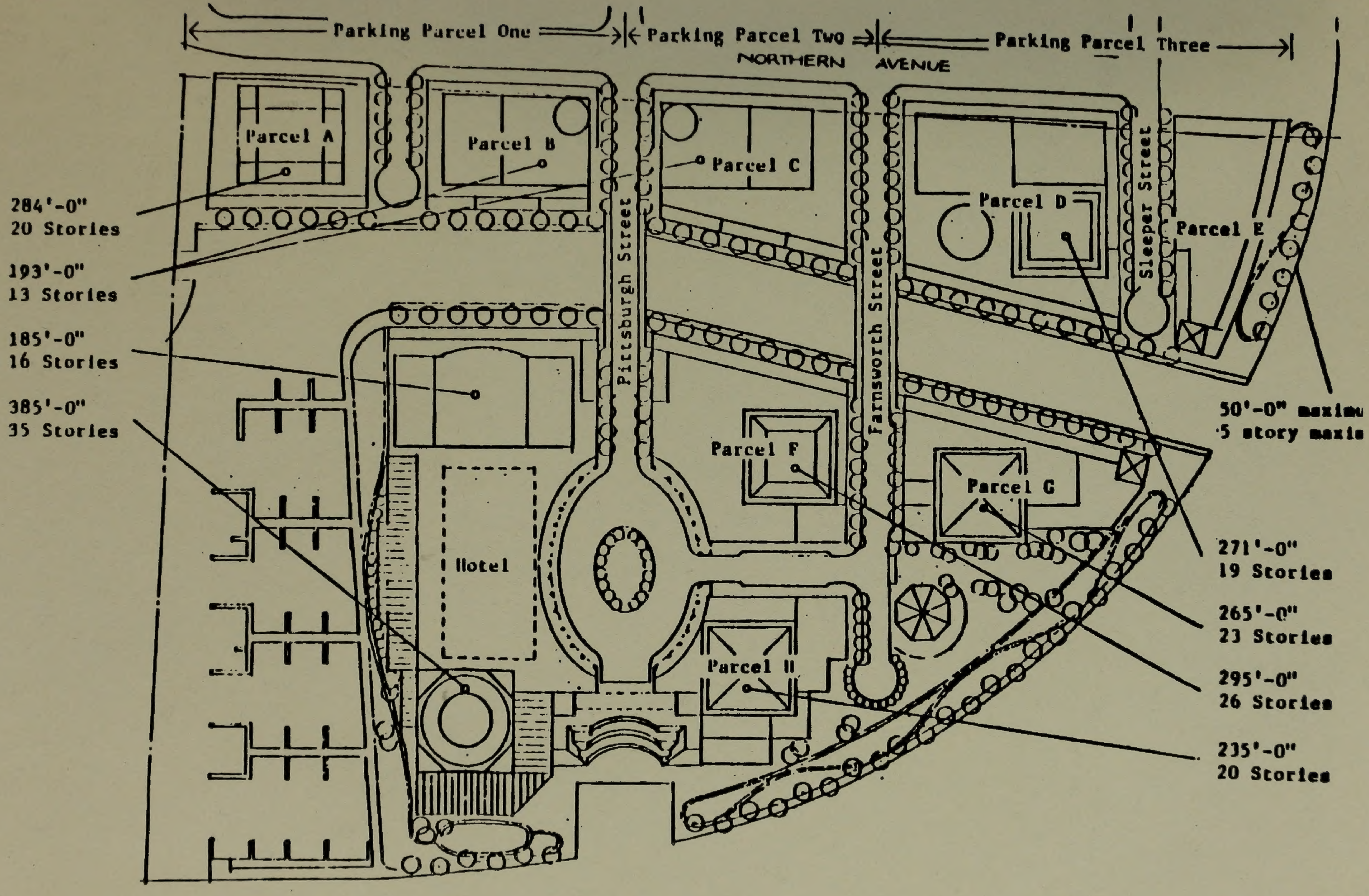
returning to you with a revised master plan for Pier 4 within the next two months.

Sincerely yours,

Rob Tuchmann

Robert Tuchmann

/kmp
Encl.



KEY PLAN

Hyatt Master Plan 8429
Cesar Pelli & Associates